RAILROAD GAZETTE

FRIDAY, NOVEMBER 16.

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Contributions.

The New England Railroad Club on English Locomotives.—A Correction.

NOVEMBER 10, 1888.

TO THE EDITOR OF THE RAILROAD GAZETTE:

The communication in the *Railroad Gazette* of Nov. 9, signed Helios, calls for slight corrections.

For "paper," read "discussion following the paper," and for "Mr. Richards," read "the President."

Take the American mogul, remove the outside cylinders, place others inside, move the forward drivers farther forward, remove the two wheel truck, and you have a locomotive substantially like the thousands used abroad, and like those used to some extent in America many years ago; they were not subject to derailment, but went out of use with the crank axle.

VOLAPÜK.

Automatic Signals.

BOSTON, Nov. 7, 1888.

TO THE EDITOR OF THE RAILROAD GAZETTE:

Can you give me space for a supplementary note on automatic signals, which your editorial in last week's issue seems to make necessary? I do not see that there need be any confusion as to whether an automatic signal is a home or a distant signal, or indeed why the question need come up at all. When it exists I think it must be due to an attempt to substitute for a well-defined principle in one system of signaling an equally well-defined principle in another system.

The home and distant signals in an interlocking system have each a legitimate, but entirely distinct, function. The home signal should stand *at* the point of danger, and a train must not pass it when it says "stop." The distant signal must be placed far enough away to give plenty of room to stop any train under all circumstances before reaching the home signal. Its *indication* is a mere repetition of that of the home signal.

An automatic signal has sometimes connected with it at a distance another signal in such a way that the indications are alike; that is, the second signal is a true distant signal for the first. All that is valuable in this application can, however, be preserved, and still kept within the legitimate principle of automatic signaling, which I conceive to be this: There is nothing to indicate to a train finding such a signal showing danger, either the place or the nature of the obstruction, hence *every point in its section* should be considered a point of danger, and trains should run though it with caution, prepared to stop at any moment. When the section of this signal overlaps that of another in advance (the only safe way of working a continuous line of automatic signals) it performs, besides the duty just mentioned, of a guard over its own section, the additional one of an indicator for a portion of the section of the next signal. There is, however, no way of distinguishing at once under which of these characters the danger signal appears, hence they should be treated alike by the trains, which should "proceed only as the way is known to be clear," until the obstruction is found or a signal which *does* indicate a clear track. Used in this way I think the question of home or distant, so far as it applies to automatic signals, may be left to take care of itself.

G. W. BLODGETT.

The West Superior Iron & Steel Co.

WEST SUPERIOR, Wis., Nov. 6, 1888.

TO THE EDITOR OF THE RAILROAD GAZETTE:

I find in the *Railroad Gazette* of Oct. 19 the statements that "pipe works for the West Superior Steel Co. at Duluth, Minn., have been completed"; that the foundation for a blast furnace has been laid and "work suspended until next Spring"; that Mr. J. P. Witherow, of Pittsburgh, built the pipe works, and has a contract for the erection of a Bessemer steel plant, to be begun next spring, etc.

Your correspondent is slightly mixed. The West Superior Iron & Steel Co. is located in Wisconsin, not in Duluth, Minn.

The pipe foundry building is now under construction, and will be completed, we hope, this month. Mr. Witherow has never been here, to my knowledge, and only has a contract for the iron trusses for the roof and placing the same in position. The foundation for the first blast furnace is now being put in, and no part of the construction work has been suspended. Mr. W. F. Mattes, of Scranton, Pa., is the chief engineer, and has full charge of construction.

Your article has evidently been noticed, for we are in constant receipt of letters addressed to Duluth and forwarded here. We are making such a stir on this side of the bay that we like to have credit for being somebody. We are not disposed to take a back seat for Duluth, and have the most unbounded faith in this growing place. The past year has seen a list of permanent improvements which any city might be proud of. The terminal grounds of the Eastern Minnesota, including docks, elevator (annex to the Great Northern), round house, coaling chutes for engines and general office building are enough in themselves. The Land & River Improvement Co. is just finishing a new hotel at a cost of about $125,000; village hall, $30,000; school house, $25,000; national bank, about $30,000, and so on. I think you need a little "boom" literature and that you should alter your old maps. Come out here and be convinced. EBEN F. WELLS.

Work Train Conductor's Daily Report.

TAZEWELL, Va., Oct. 28, 1888.

TO THE EDITOR OF THE RAILROAD GAZETTE:

I send you herewith for publication a copy of the work train conductor's daily report in use on the Pittsburgh & Western Railroad during my connection with that road as its Chief Engineer some years ago.

I consider this a very complete and comprehensive form, adapted as well for use on construction as on maintenance of way.

The face of the form shows the date, the number of the engine and its daily mileage, as well as the names, occupation and time of the crew. In addition, the time of arrival and departure at different stations or sidings is shown, which is particularly useful in determining time lost in getting out of the way and waiting for regular trains. On the back is shown the materials used and where. On the inside the upper half shows character of material transported and between what points. The lower half is arranged to show kind of labor performed and at what points by work train force.

A more detailed description is hardly necessary, as the full import of the form can be gleaned from an inspection of the same. Yours truly, EMILE LOW.

[The form is 7 in. × 8 in. As reproduced it is reduced in size to fit our columns, the aim being to show only the headings and ruling.—EDITOR RAILROAD GAZETTE.]

Face of Form.

PITTSBURGH & WESTERN RAILROAD COMPANY.
MAINTENANCE OF WAY.

Work Train Conductor's Daily Report for.....188

Character of Material Transported.	No. of Cars.	Number, Amount or Quantity.	From Where Taken.	Where Delivered.	Miles.	REMARKS.

DESCRIPTION OF LABOR PERFORMED.	ON WHAT SUB-DIVISION. No. Hours Laborers.	No. Hours Laborers.	No. Hours Laborers.	No. Hours Laborers.	STATE HERE WORK DONE THAT IS NOT DIRECTLY CHARGEABLE TO SUB-DIVISIONS. DESCRIPTION OF LABOR PERFORMED.	LOCALITY.	Hours Laborers.	REMARKS
BALLAST—Quarrying Stone....								
" Breaking.....								
" Loading.....								
" Unloading.....								
BALLLASTING TRACK.....								
SURFACING TRACK.....								
CLEANING DITCHES.....								
REMOVING SLIDES.....								
SLOPING CUTS.....								
WIDENING EMBANKMENTS.								
HAULING EARTH.....								
" BALLAST.....								
Total Hours Worked Each Day..								

Back of Form.

FORM M. W. 607.
PITTSBURGH & WESTERN R. R. CO.
MAINTENANCE OF WAY.
Work Train Conductor's Daily Report,
For.....188

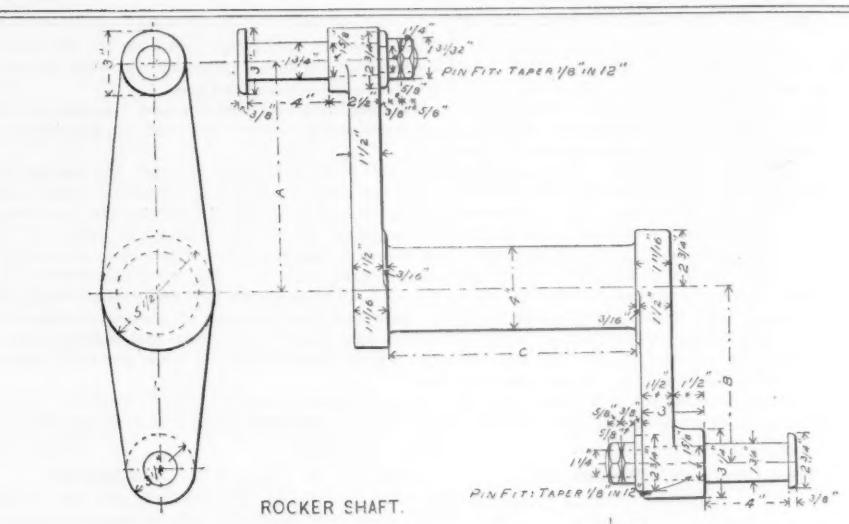
ENGINE No. MILEAGE,
NAMES. OCCUPATION. HOURS.
ENGINEMAN.
FIREMAN.
CONDUCTOR.
FOREMAN.
BRAKEMAN.
do.

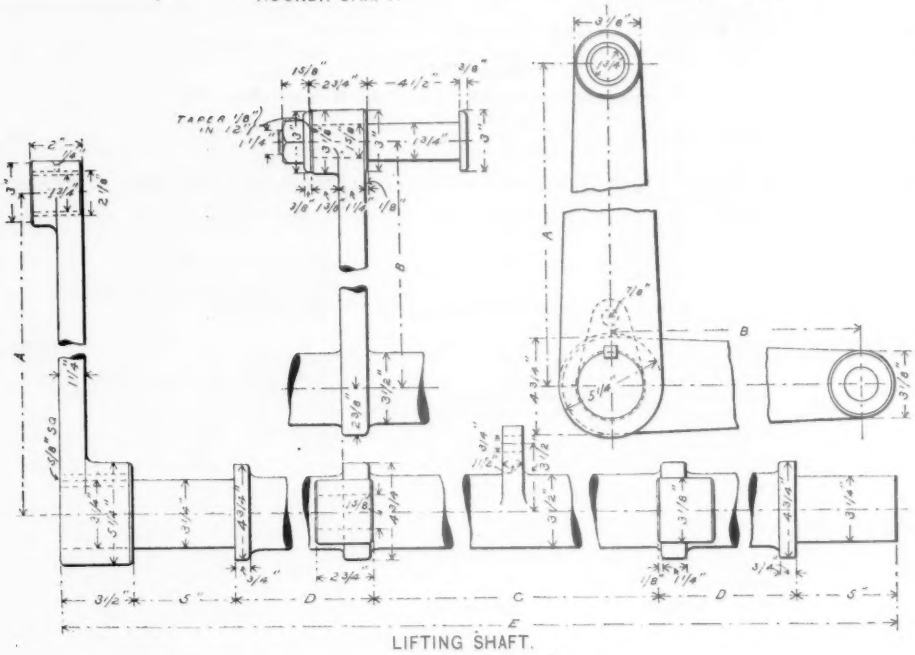
DEPARTURE AND ARRIVAL AT STATIONS AND SIDINGS.

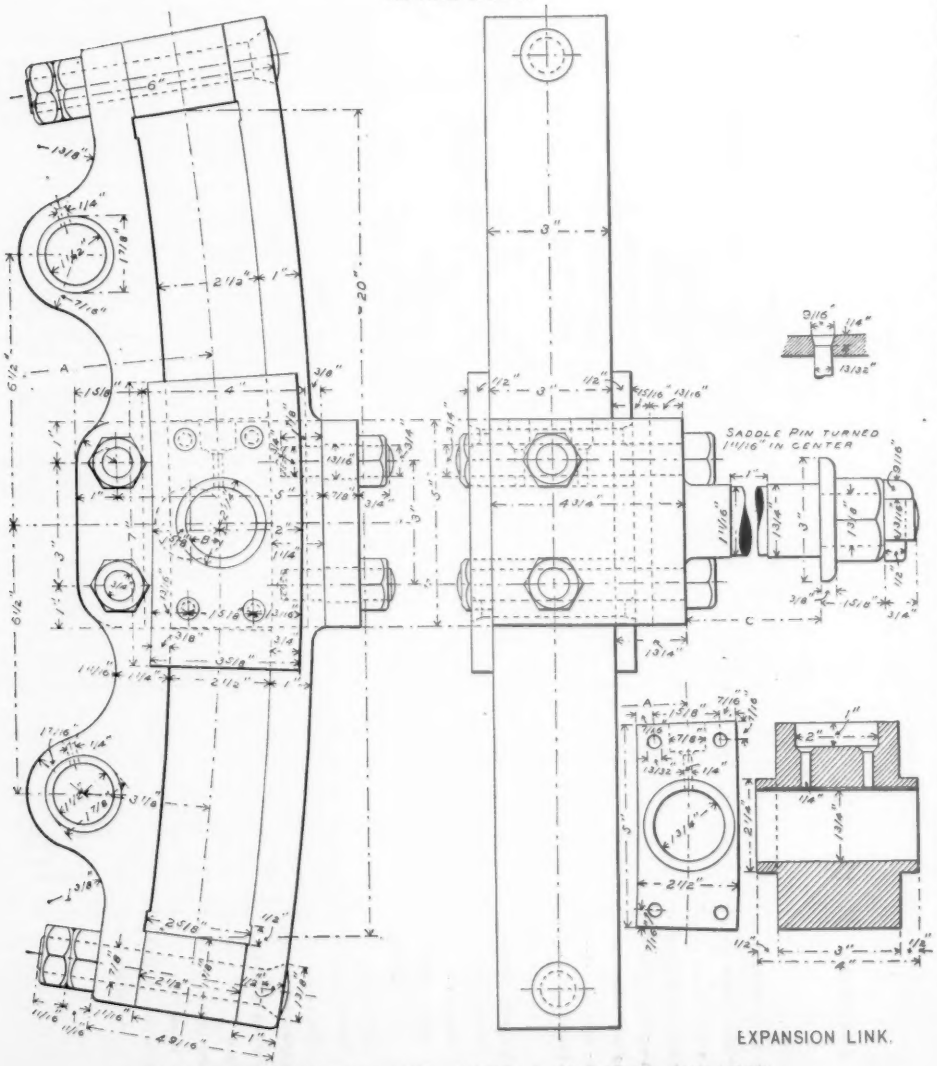
Time of Departure.	East or West.	Time of Arrival.	Names or Numbers of Stations.	TRAINS MET AND PASSED. No. of train.	Time.

DAILY REPORT OF MATERIALS USED.

MATERIALS.	No. USED.	SUB-DIVISION.	BETWEEN WHICH MILE POSTS.
Cross-ties.....			
Rails—lineal feet.....			
Splice bars—pairs.....			
Bolts and nuts.....			
Railroad spikes—kegs..			
Crossing plank—lineal ft.			
Cut spikes—kegs.....			
Nails—kegs.....			
No. 6 frogs.....			
No. 8 "			
Switch stands—cast....			
" rods.....			
" targets.....			
" chairs—single...			
" " —double..			
" bridles.....			
" locks.....			
" ties.....			
Switches—ground lever.			
Oil—carbon, quarts.....			
(" —lard "			
Powder—kegs.....			
Fuse—lineal feet.....			
Ballast'stone—cubic yds.			
" " —lineal ft..			







EXPRESS LOCOMOTIVE, LAKE SHORE & MICHIGAN SOUTHERN.
Built by THE BROOKS LOCOMOTIVE WORKS, *Dunkirk, N. Y.*

Express Locomotive, Brooks Locomotive Works.

The accompanying engravings represent two fine express locomotives just built by the Brooks Locomotive Works for working the fast mail trains on the Buffalo and Erie divisions of the Lake Shore & Michigan Southern. The heaviest grades are situated on these divisions, which are also most exposed to strong winds from the lake. The line, however, is fairly straight and level. The ruling grades are 53 to 46 ft. per mile, and the average grade for the whole line or sum of the rises and falls is 5.2 ft. per mile. This latter figure is below the average of other lines, showing that the length of the grades bears a small proportion to the total length of the road. Only 12 per cent. of the length of the main line is curved, and the average curvature per mile is 7.8 degrees. This is also considerably below the average, the curvature per mile on the New York Central (Albany to Buffalo) being nearly double that amount (15.1 deg.), while on the middle and western divisions of the Pennsylvania it is 46.8 and 72.5 degrees per mile respectively, while on the Lehigh Valley the amount of curvature rises to 100 degrees per mile.

The principal features of these engines are clearly shown in the engravings and detailed specification. The boiler is of heavy construction and designed to carry a working pressure of 180 lbs. per square inch. The fire-box is very deep, and is provided with a fire-brick arch supported on three water tubes. The cylinders and steam chests are heavier than usual in locomotives of this type. All the steam passages are extra large, and the throttle valve and port openings, while large, are as direct as possible in order to secure the highest possible effective pressure. The driving wheels have the tires secured by Mansell retaining rings. The valve motion throughout is far heavier than used in ordinary practice, and is specially designed for heavy service and fast running. The steam ports are 17 × 1½ in., and exhaust 17 × 3 in. The valves are of the Allen type, balanced, and have a travel of 5¾ in. in full gear. The eccentrics have a throw of 4½ in., and are 4 in. wide on face. Every bearing throughout the entire link motion is bushed and case hardened and is of extra large size. The links are 3 in. wide on face and the link eyes 13 in. centres. The lifting shaft boxes are 3¼ in. diameter by 5 in. long, and the vertical arm is arranged outside the frame, being perfectly straight and directly in line with the reverse lever, thereby preventing any spring while running. The reverse lever is arranged with the Player fine graduated latch and quadrant, which gives the finest possible adjustment to the position of the link. This arrangement is the invention of Mr. John Player, the Chief Draughtsman of the Brooks Locomotive Works.

This arrangement of reverse lever latch was originally designed for the West Shore, and is used on all the engines on that road. It is also used on the Chicago, Burlington & Quincy and on several other roads.

The engines throughout are designed to stand the severe strains incident to hauling heavy loads at the highest speeds, and the weight upon drivers and truck is distributed to secure steady running and ample adhesion. These engines are in regular service hauling the "Fast Mail" and heavy express trains, consisting of 14 or 15 cars, and are giving great satisfaction.

Two somewhat similar engines were designed by Mr. G. W. Stevens, Superintendent Motive Power of the line, about two years ago. These engines were built by the Schenectady Locomotive Works and, like the engine now illustrated, carried a boiler pressure of 180 lbs. per sq. in.* The performance of these engines in actual service is approximately as follows:

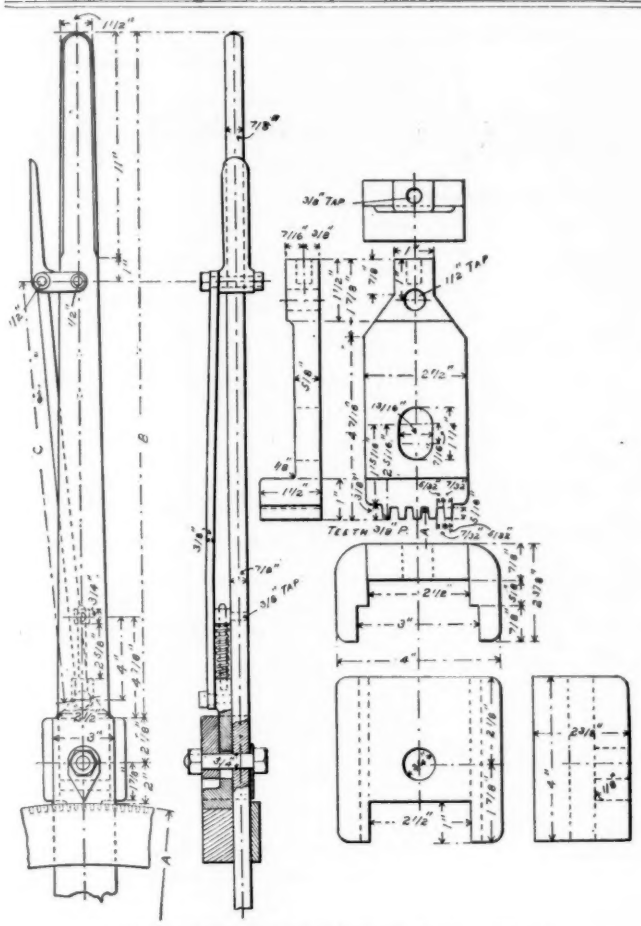
Weight of train, including engine and tender....	695,000 lbs.
Average speed while in motion, deducting stops, but making no allowance for time lost in gaining and reducing speed.....	46.1 miles.
Speed, including stops.....	26 to 38 miles.
Average distance between stopping stations.....	25.4 miles.
Consumption of coal per train mile.....	66.89 lbs.
" " car "	5.65 lbs.
Evaporation of water per lb. of coal.....	5.55 lbs.

The engines now illustrated have not been sufficiently long in service to enable any reliable data to be obtained as to their performance, but it seems probable that they will give an even better showing. The new engines weigh 110,000 lbs. in working order, while those built two years ago weighed only 94.000 lbs. This difference of 16,000 lbs. in weight affords a considerable margin for strengthening the working parts and generally increasing the efficiency of the engine. An inspection of the drawings will show that the engines are very carefully designed throughout, all the details that go so far to make or mar the success of a locomotive being very thoroughly worked out.

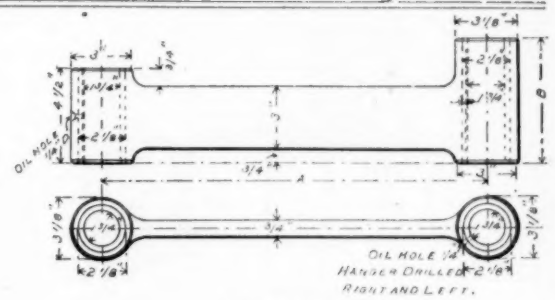
Our engravings reproduce the working drawings as used in the shops, the principal difference being in the omission of comparatively unimportant detail, and the scale, which is, of course, reduced to fit our pages. Each detail drawing is made to serve for several different orders by marking the dimensions common to all these orders or lots of engines in figures, while the variable dimensions which may differ in each order are indicated by letters. Thus the coupling rod end is exactly alike for many classes of engines, though the length between centres may vary considerably. Each working drawing has on it a small table, giving the length of each lettered dimension for each class of engine. One of these tables, that for the throttle valve, is reproduced below. It will be seen by reference to the engraving of the throttle valve, that the variations are all on the length and height of the principal parts and not in diameter or thickness, and that therefore the patterns can be easily adapted to suit the different engines.

This method of indicating the variable dimensions by let-

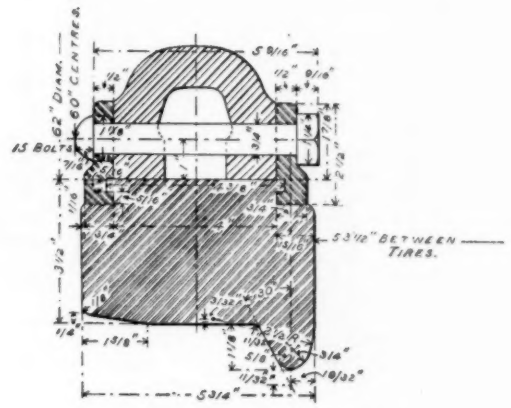
*One of these engines was illustrated and described in the *Railroad Gazette*, March 11, 1887.



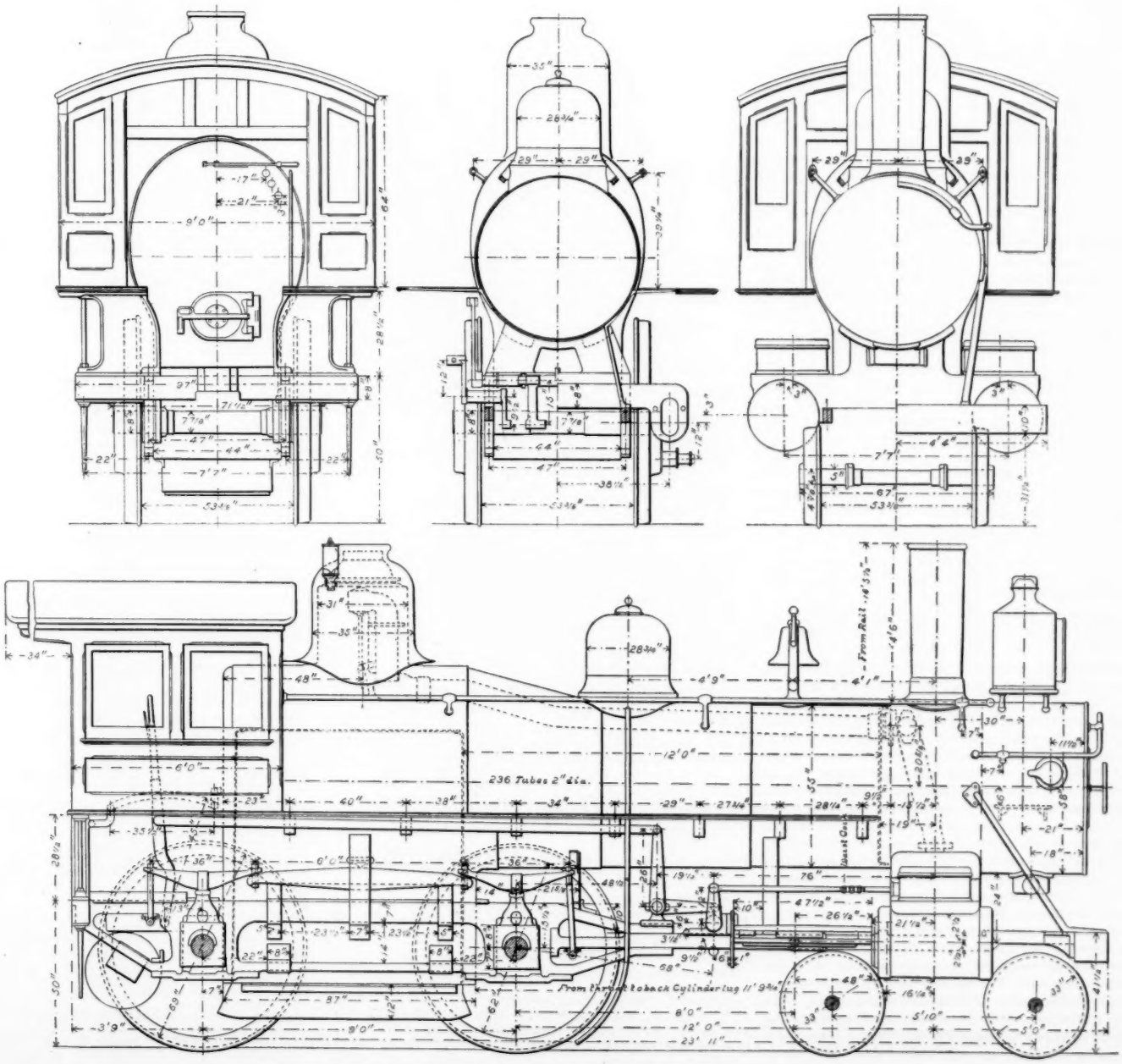
REVERSE LEVER, with Player's Finely Graduated Latch.



Lift Shaft Link.

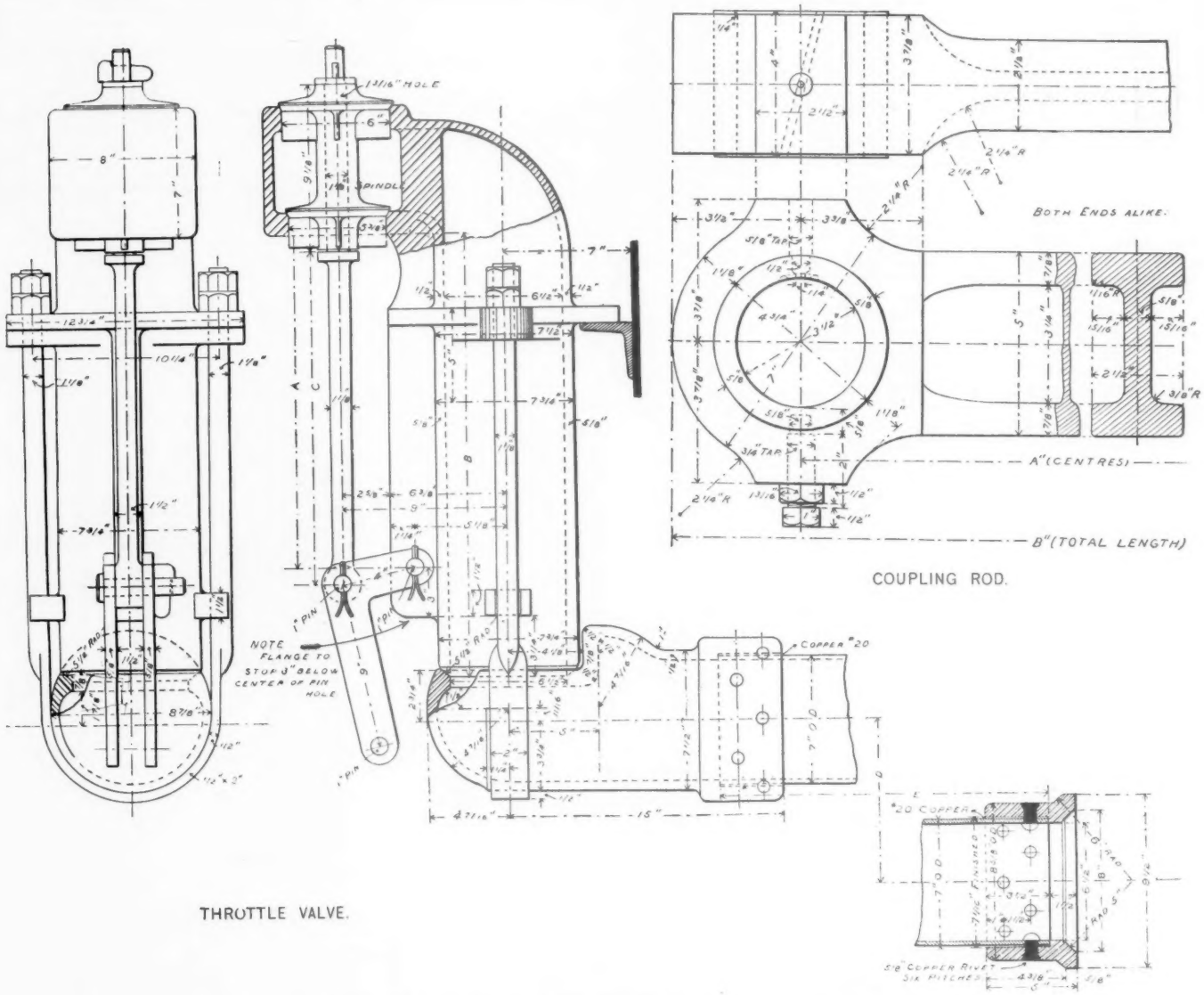


Driving Tire with Mansell Fastening.



EXPRESS PASSENGER LOCOMOTIVE, LAKE SHORE & MICHIGAN SOUTHERN.

Built by THE BROOKS LOCOMOTIVE WORKS, *Dunkirk, N. Y.*



THROTTLE VALVE. COUPLING ROD.

EXPRESS LOCOMOTIVE, LAKE SHORE & MICHIGAN SOUTHERN.

Built by THE BROOKS LOCOMOTIVE WORKS, *Dunkirk, N. Y.*

ters appears to be preferable to indicating it by marking all the various dimensions in figures on the dimension lines. If different colored inks are used, they cannot be reproduced in a blue print and therefore the number of the order must be added to the dimension to which it applies. This crowds the drawing and is apt to produce confusion and mistakes.

Order.	A.	B.	C.	D.	E.
298	18	24	18	11	160
300	6½	28	7¼	10	151
297	18	24	18	9	145
304	18	24	18	9	145
305	13	24	13	4	145
307		Card 4 442		4	145
310		Card 4 442		4	145
308	18	24	18	0	68
312	13	24	13	4	145
316	13	24	13	4	145

The following table gives the variable dimensions for all the details illustrated in this issue :

VALUES OF LETTERED DIMENSIONS.

	A. in.	B. in.	C. in.	D. in.	E. in.
Throttle valve	18	24	18	11	160
Lift shaft	26	20	21¾	10⅛	55½
Lift shaft hanger	15	6	..	..	..
Link	68	5/8	6	..	..
Rocker shaft	12	9½	12	..	..
Reverse lever	45	28⅞	16 1/16	..	..
Coupling rod	108	115	..	..	..

Further drawings of these locomotives will be given in an early issue. The general dimensions are shown on the erecting cards, and the construction and size of the principal parts are indicated by the specification given below, which is prepared from a remarkably full and detailed specification kindly supplied by the makers, the Brooks Locomotive Works. Both specification and drawings are executed in excellent style and speak volumes for the management and organization of the Brooks Locomotive Works, and reflect especial credit on the drawing office staff, on whom falls the principal labor of preparing the drawings and specifications.

The general diagrams of the engine, as shown on the accompanying engraving, are reproduced from the "erecting cards, which are used in the erecting shop only. Such details as the location of Westinghouse reservoir, pump, etc., are shown on separate cards and referred to in the "card books" and "erecting specifications" furnished to foremen. This allows the same cards to be used for different engines in various combinations. The main reservoir in this case is underneath the foot plate. The driver brake auxiliary is the forward reservoir of the two under running board (see perspective view) and the short one in the rear is the equalizing reservoir for the engineer's brake valve. There is no train signal apparatus on these engines.

BROOKS LOCOMOTIVE WORKS.

Specification for two Locomotives, Order No. 298, *Class* 18 *A.*
Built for the Lake Shore & Michigan Southern Ry. Co., 1888.
Building Nos. 1412, 1413.

Cylinders, 18 *in. by* 24 *in.; Drivers*, 69 *in. diam.; Gauge*, 4 *ft.* 8½ *in.; Fuel, Bituminous Coal.*

Office Specification No. 3138 *D.*

Boiler, of the kind known as wagon top.
Diam. at smoke box end, 55 in.
Material, 58,000@62,000 steel.
Smoke box sheet, ⅝ in. thick, 32½ by 182.
Smoke box extension, ⅜ in. thick, 35½ by 182.
First cylinder, course ½ in. thick, 57 by 181.
Second cylinder, course ½ in. thick, 57 by 184.
Top connections, ½ in. thick, 63 by 114.
Bottom connections, ½ in. thick, 42 by 108.
Throat sheet, ½ in. thick, Sk. 4737.
Side sheet, ½ in. thick, 81½ by 105.
Wagon top, ½ in. thick, 81½ by 63.
Door sheet, ½ in. thick, Sk. 4738.
Dome sheet, ½ in. thick, 37 by 100.
Tube sheet, ¾ in. thick, 60 dia.

Dome, 31 in. diam. 27 in., height of sheet.
Placed on wagon top.

Smoke Box, extended 70 in.
Netting of 2½ by 2½ mesh, wire No. 10 W. G.
Deflector, perforated plate, adjustable.
Discharge opening, double steam, B. L. W.
Hand hole plates, R. R. Co.'s.

Mud Drum. None.
Mud cock with pipe attached.

Fire-box, 78 in. long, 35 in. wide, 85½ in. deep ins.
Material, steel, 58,000@62,000.
Side sheets, 5-16 in. thick, 84½ by 77.
Crown sheets, ⅜ in. thick, 55 by 76.
Door sheets, 5-16 in. thick, 55 by 90.
Tube sheets, ½ in. thick, 55 by 90.

Combustion Chamber. None.

Water Space, 4 in. front, 4 in. sides.
3 in. back. Bar, 2½ in. thick.

Crown, stayed by crown bars ⅞ in. by 5 in. welded at ends.
Rivets ⅞ in. dia., with ⅝ in. clip washers under head.
Ferrules 2⅛ in. high, ⅛ in. plate between ferrules and crown bars.
Crown 1½ in. raise in centre.
Stay bolts, 1 in. diam., not over 4 in. by 4 in. cen.
Top row double with ⅛ in. hole; 4th and 5th from bottom ⅝ in. hole.

Tubes of charcoal iron 2 in. diam., 236 in number, 12 ft. 0 in. long, W. G. No. 12 front, 12 back copper rings on fire-box ends.

Stack, of steel, taper form, 18 in. diam.
Top, ½ in. oval bead, 14 ft. 7 in. above rail.

Grates, B. L. W. standard. No dump.

Ash Pan, 12 in. deep, with damper at both ends.

Hand Hole, — in. by — in. placed. None.

Cleaning Holes, 2 in. diam., placed in corners of fire-box. None in smoke box.

Boiler tested at 200 lbs. steam pressure.

Fire Brick (card 1891), 3 pipes 2 in. O. D. by No. 12 B. W. G.

Fire Door, 14 in. by 17 in. set with copper ferrules.

Heating Surface 175 sq. ft. in fire-box.
1,470 sq. ft. in tubes.
1,645 sq. ft. in all.

Grate, area, 18¾ sq. ft.

Cylinders, 18 in. diam., 24 in. stroke, made with half saddle 77 in. cen. to cen.
Steam ports, 17 in. by 1½ in. Bridges, 1¾ in.
Exhaust ports, 17 in. by 3 in. Outside bridge, 1⅝ in.
Vlv. travel, 5¾ in.; Lap. o. s. 1 in., i. s. 1-16 in. each end.
Vlv. lead, 1-16 in. Eccentric throw, 4½ in.

Exhaust Nozzles, single and double with thimbles.
Single, 4¾ in. diam. 4½ in. diam.
Double, 3¼ in diam. 3¼ in. diam.

Pistons, fitted with solid head and snap ring packing.
Rods, 3⅜ in. diam., of cold rolled steel.

Cross-heads of steel by Chester.
Wrist-pin, 3 in. diam. by 4 in. long.
Wings, 2½ in. thick, 16 in. long.
Gibs of brass, 16 in. long, ¼ in. thick.
Top guide 4 in. wide, bottom 3 in. wide ⅂ section.

Guides of C. H. iron, 4 to each cross-head, 1⅝ in. thick at ends, 2-2¼ in. in cen., 4-3 in. wide.

Yoke extending across frames.

Links of iron, with steel bushings, 3 in. wide on face. Cen. to cen. of knuckle joints 13 in.
Skeleton link with angular pin plate.

Rocker Shafts of iron, with arms forged on, 1½ in. thick, 12 in. top centres, 9½ bottom.
Journals, 4 in. diam. 12 in. long.

Eccentrics in halves. Key and 2 set screws.

Frames, with solid pedestals, top bar 3 in. wide by 5 in. deep, 47 in. centres across.
Pedestals with movable wedges on front legs.
Double shoe, with separate wedge at back.

Driving Wheel Base, 9 ft.
Truck wheel base, 5 ft. 10 in.
Engine wheel base, total 23 ft. 11 in.
Tender wheel base, total, 14 ft. 6 in.
Engine and tender wheel base, total 45 ft. 7½ in.

Driving Wheels, centres 62 in. diam.
Outside of tires, 69 in. diam.
Play on track, 9⅛ in.

Tires of O. H. steel, by Midvale S. Co.
Inside diam. 62 in., outside diam. 69 in., tapered to 68¾ in. on outside edge; held on by shrinkage and Mansell retaining rings.
Flange tires, 3½ in. thick, 5¾ in. wide, on all pairs of wheels

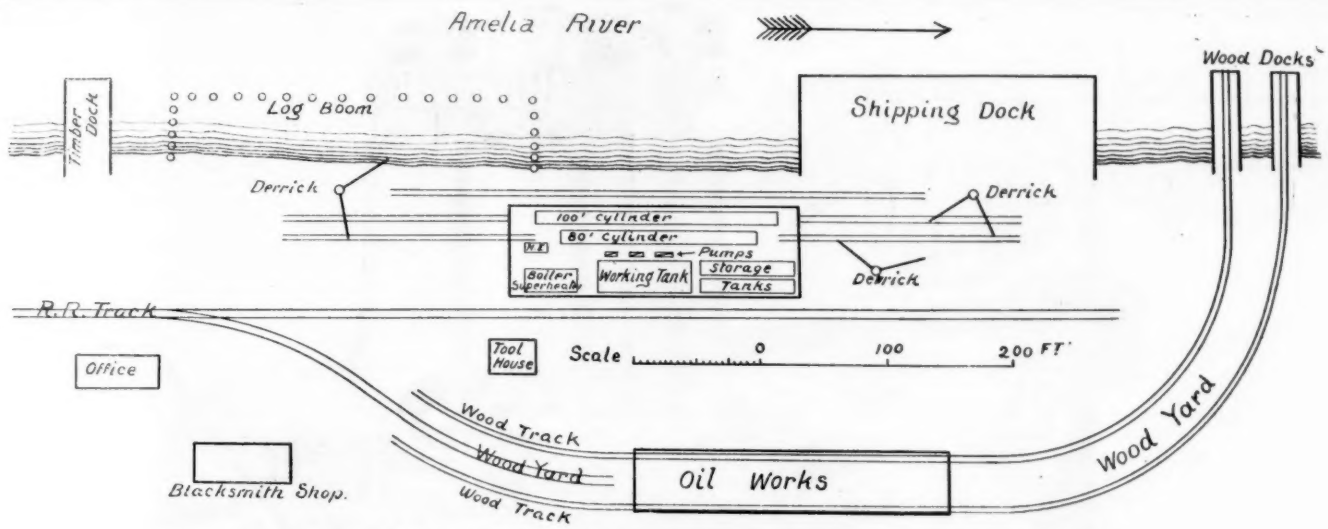
Driving Axles of muck bar, by B. L. W.
Journals, 8 in. diam., 8 in. long.
Wheel Fits 8 in. diam., 8⅛ in. long.
Total finished length of axle, 71½ in.
Shoulder on inside of wheel fit, 8⅛ in. diam. by ¼ in. long.

Crank Pins of O. H. Steel, by Midvale S. Co.
Main journal, 5 in. diam., 5 in. long.
Side journals, 3½ in. diam., 4 in. long.
Main pin, wheel fit 5 in. diam., 7¾ in. long.

Driving Boxes of cast iron with brass bearings.
Driving box saddles cast on box with loose cap.

Connecting Rods of hammered iron, by B. L. W.
Main rod, 96 in. centres, body of rectangular form.
Side rod, 108 in. centres, body of I form.
Side rods O. H. Steel.
Main rod brasses, babbited with white metal.
Side rods, solid ends, bushed. No babbitt.

Driving Springs of steel, by French, to carry 16,500 lbs. each, 36. in. long, 8¼ in. set loaded, with 15 plates 3¼ in. wide, ⅝ in. thick, 4 full length plates. (70,000 miles.)



WORKS OF THE CREOSOTE LUMBER & CONSTRUCTION CO., FERNANDINA, FLORIDA.

Engine Truck with 4 wheels and a swing centre of cast iron, B. L. W. pattern.
Frame of wrought iron, pedestals of cast iron.
Steel tired wheels, by Allen Paper Car Wheel Co., 33 in. diam., 5/8 in. play on track.
Axles of ham'd iron, by B. L. W.
Journals, 5 in. diam., 10½ in. long, 42 in cens.
Wheel fits, 4⅞ in. diam., 7¼ in. long, 52⅛ in. between hubs.
Total finished length of axle, 67 in.
Springs of steel, by French, to carry 17,500 lbs. each, 36 in. long, 9¼ in. set loaded, with 16 plates 4 in. wide, ⅜ in. thick, 4 full length plates. (70,000 miles.)

Pilot of Oak, 5 ft. 0 in. long, draw-bar to couple 35 in. above rail.
Bumper of oak, 12 in. wide, 9 in. deep.
Bumper blocks. None.
Steps on bumper. None.

Flag Stands, of cast iron on bumper.

Feed Water, supplied by 2 No. 9 Monitor injectors placed on run board inside cab.
Injector check by injector makers placed 11 in. from flue sheet. Check pipes of iron.
Steam pipes of copper. Feed pipes of iron.

Throttle Valve, 6 in. diam., placed in dome.
Dry pipes of wrot. iron, 7 in. diam.

Safety Valves, 2 Richardson open pops (heavy). Set at 180 and 182 lbs. per sq. in.

Sand Box, 24 in. diam., placed on waist.
Pipes of iron, to lead to front drivers.

Bell, weighing 110 lbs., placed on waist, forward.

Whistle, 5 in. diam., on side of dome; 3 in. Crosby chime.

Headlight. None.

Shelf, Oak, round nosing, 4 columns.

Running Boards, cast iron in front. wrot. iron back.

Wheel Covers, B. L. W., 1 in. pipe nosing.

Hand Rail, 1¼ in. iron pipe. Columns, R. R. Co.'s.

Cab of Ash, high roof, 10 ft. 0 in. radius.
Roof, pine. Covered with 1 X tin plate.
Sash, cherry. Glass D. T.

Foot Plate, of cast iron, 4,200 lbs.

Brake, kind, Westinghouse automatic applied to drivers and tender and train; 8 in. pump on R side, air drum 26 in. diam. by 35 in. long, placed under foot plate.

Driver Brake, 8 in. push cylinders, with aux. reservoirs.

Oil Cups.
Cylinder, Nathan No. 8, placed on turret, with 11-16 in. copper pipes under jacket.
Guide, B. L. W. Eccentric, R. R. Co.'s.
Conn. rod, front, R. R. Co's.
Conn. rod, back, R. R. Co's.
Side rod, R. R. Co's.
Rocker box, B. L. W.

Cocks and Valves.
Cylinder cocks, R. R. Co's. 2 extra in exhaust.
Blow-off cocks placed on back of fire-box.
Surface cocks. None.
Gauge cocks 3 in number, lower one placed 3 in. above crown, the other placed 3½ in. cen. to centre. B. L. W.
Heater cocks. None.
Blow-back valves. None.
Glass water gauge, by B. L. W.
Steam gauge. by Ashcroft; 6¾ in. diam., case of iron. Stand of iron.
Clock. None.

Finish.
Boiler jacket, planished iron; bands, plan'd iron.
Dome, casing, No. 16 steel, flanged. Mouldings, none.
Sand box, casing cast iron. Mouldings, none.
Dome flow. None.
Cylinder casing, No. 18 Kalamein iron, painted.
Cylinder head, casing, cast iron, painted.
Steam chest, casing, side No. 18 Kal. iron, top cast iron.
Running board, edge cast iron.
Lamp shelf, edge. None.
Hand railing, 1¼ pipe, painted.
Wheel cover, edge 1 in. pipe, painted.

Painting, Lettering, &c.
Body color of engine and tender, black.
Inside of cab, Indian red.
Striping color engine and tender, gold leaf.
Striping of tank, style broad band.
Lettering or Nos., per R. R. Co.'s stencils, gold leaf.

Tender, with 2, 4 wheeled trucks.
Frame of channel iron, R. R. Co.'s style.
Side sills, 6 in. × 2½ in.; bolsters, ½ in. × 16 in.
Front end, centre and back end sills, 6 in. × 2½ in. channel.
Back draw casting with 2 drawbar pockets to couple (has loose Miller buffer), 35 in. above rail.

Trucks, with 4 wheels.
Frame of R. R. Co.'s arch bar form.
Iron, 4 in. × 1⅛ in. for top bar and arch bar.
Iron, 4 in. × ¾ in. lower bar.
Bolster of channels, 9 in. × 2⅛ in., 88¼ in. long.
Steel tired wheels, Allen paper, 36 in. diam., with ¾ in. play on track.
Axles of H. iron, 51 in. spread, by B. L. W.
Journals, 4¾ in. diam., 8 in. long, 75 in. cens.
Wheel fits, 4⅞ in. diam., 7 in. long.
Total finished length of axle, 83¼ in., *Johann box.*
Springs of steel, by French (70,000 miles).
2 forward to carry, 17,000 lbs. each.
43 in. long, 10¾ in. set loaded, with 17 plates.
4 in. wide, ⅜ in. thick, 4 full length plates.
2 back, longitudinal, to carry 17,000 lbs. each.
51 in. long, 11½ in. set loaded, with 18 plates.
4 in. wide, ⅜ in. thick, 4 full length plates.

Brakes, by Westinghouse (10 in. cylinder), applied to both trucks.

Safety Chains of ⅞ in. diam., iron, to be attached to both ends of truck.

Tool Boxes, each side on top of tank, and on back of tank, R. R. Cos. See drawing.

Steps on front end attached to frame.

Tank of ⊂ form C. H. No. 1 iron, inside 216 in. long, 96 in. wide, 50½ in. high.
Water capacity, 3,500 gallons.
Coal capacity, 7½ tons.
Plates, ¼ in. top, ¼ in. bottom, 3-16 in. sides.
Top of tank floored over. See drawing.

Weight of Engine, working order, 110,000 lbs.
Weight on forward truck, working order, 36,800 lbs.
Weight on 1st pr. drivers, working order, 37,500 lbs.
Weight on 2d pr. drivers, working order, 35,700 lbs.

Weight of Tender, water and fuel, 74,000 lbs.
Weight on forward truck, 36,000 lbs.
Weight on back truck, 38,000 lbs.
Weight of tender, empty, 32,250 lbs.

Tonnage.—The engine will haul, in addition to its own and tender's weight, the track being in good condition and comparatively free from curves:
On a level, 2,090 gross tons.
On 20 ft. grade, 1,003 gross tons.
On 40 ft. grade, 606 gross tons.
On 60 ft. grade, 439 gross tons.
On 80 ft. grade, 334 gross tons.
On 100 ft. grade, 272 gross tons.

Road Nos. 220, 224.

REMARKS:

Boiler—Painted 2 coats ironclad paint.

Fire-box—Caulked inside and outside.

Tender—Frame and trucks painted 1 coat of ironclad and 2 coats of oil and lead paint before framing.

Bolts—All threads U. S. Standard.
All body bound bolts taper, 1.16 in. in 12 in.

Reverse Lever and Quadrant—Player latch.

Finish—Coupling rods planed and painted.
Main rods, rocker arms, valve rods, lifting shaft, link lifters, all smooth forged and painted black.
All work inside cab painted black.

Lagging and Jacket—Boiler outside of cab covered with 1-16 in. asbestos paper, and ⅜ in. pine lagging, and jacketed with planished iron.
Boiler, inside cab, including backhead, covered with ⅛ in. asbestos paper, 1 in. hair felt, and jacketed with No. 24 planished iron. (See detail drawing.)
Fire-box below run boards, throat sheet and foot plate covered with ⅛ in. asbestos paper, 1 in. hair felt and jacketed with 18 Kalamein iron. (See detail drawing.)

Tools—Two 2½ in. jacks and levers. One each of the following:
Pinch bar, 15 in. C. H. monkey wrench, No. 2 hand hammer, soft hammer, flat and cape chisels, set packing wrenches, set spanner wrenches, set plug and flat wrenches, set packing irons, wrought iron pail, broom, shovel, pick, slice bar, hoe, hook, tallow pot, set oil cans, torch, gauge lamp, water gauge lamp, hand lamp and 2 flags.

The Works and Process of the Creosote Lumber and Construction Co.

The following description of the works and process of this company, and the sketch of the general arrangement of the plant, have been prepared for us by Mr. B. T. Burchardi, Chief Engineer and Superintendent.

The works are located at Fernandina, Fla., on the bank of the Amelia River, within a mile of the Cumberland sound, and have a water front of 1,000 ft., with an average depth of water at the docks, at low tide, of 16 ft.

A railroad track connects the yard with all the lumber docks of Fernandina, and also with the Florida Railway & Navigation Co., which gives connections via Callahan with the Plant system of railroads for the North, and via the Pensacola & Atlantic with all railroads leading to the west. By the lines of the Florida Railway & Navigation Co. the Gulf coast and the interior of Florida are reached.

The attached plan of the general arrangement of the works will explain itself.

The process is divided into two distinct departments or operations: the manufacture of oil, and the treatment of the timber. The oil is made from the so-called lightwood. The lightwood is obtained from the resinous yellow pine trees, which are killed either accidentally or for the purpose, not from trees which are in the process of decomposition.

This lightwood is placed in iron retorts, 6 ft. in diameter, 25 ft. long, set horizontally in brick furnaces and having doors at both ends. Each retort holds about 4 cords of wood. The company has 12 retorts in operation.

After the retorts are filled the doors are closed hermetically and fire started in the furnaces. A copper worm, standing in a tank of water, is connected at one end with the top of the retort and is open at the other, the lower end. Each retort is provided with a thermometer capable of registering 1,000 degrees Fahr. When the retorts are heated to about 225 deg. the wood commences to give up its moisture in the shape of vapors, which, passing through the constantly co led worm, issue from the lower end as water. As the temperature rises the lighter acids and oils pass off in a similar way. Up to this time the firing of the retorts has been done very slowly, and none of the distillates so far obtained are used, but allowed to run away. As soon as the thermometer registers from 380 to 400 deg. the wood tar commences to form in the retort, and the firing is at once increased, and all the distillates received from that time on are carefully saved and used in the preservation of the timber. The distillation is carried on until the retorts discontinue to flow, which is generally the case at from 650 to 700 deg. The only residue left in the retort is charcoal, which is absolutely perfect. The oil so obtained is heavier than water, and its analysis is, as given by Professor Chandler, of the Lehigh University, as follows:

	Per cent.
Acetic acid	1.5
Light oil	28.5
Heavy oil	59.0
Pitch and loss	11.0
	100.0

It contains of wood tar creosote, crude, 20 per cent.

The charcoal is used for fuel in the different furnaces.

From careful measurements I ascertained that there are about 175 gallons of liquid matter in one cord or 128 cubic feet of wood, or nearly 1.37 gallons in one cubic foot. We make use of about 75 gallons, the other 100 gallons pass away before the temperature rises to 400 deg.

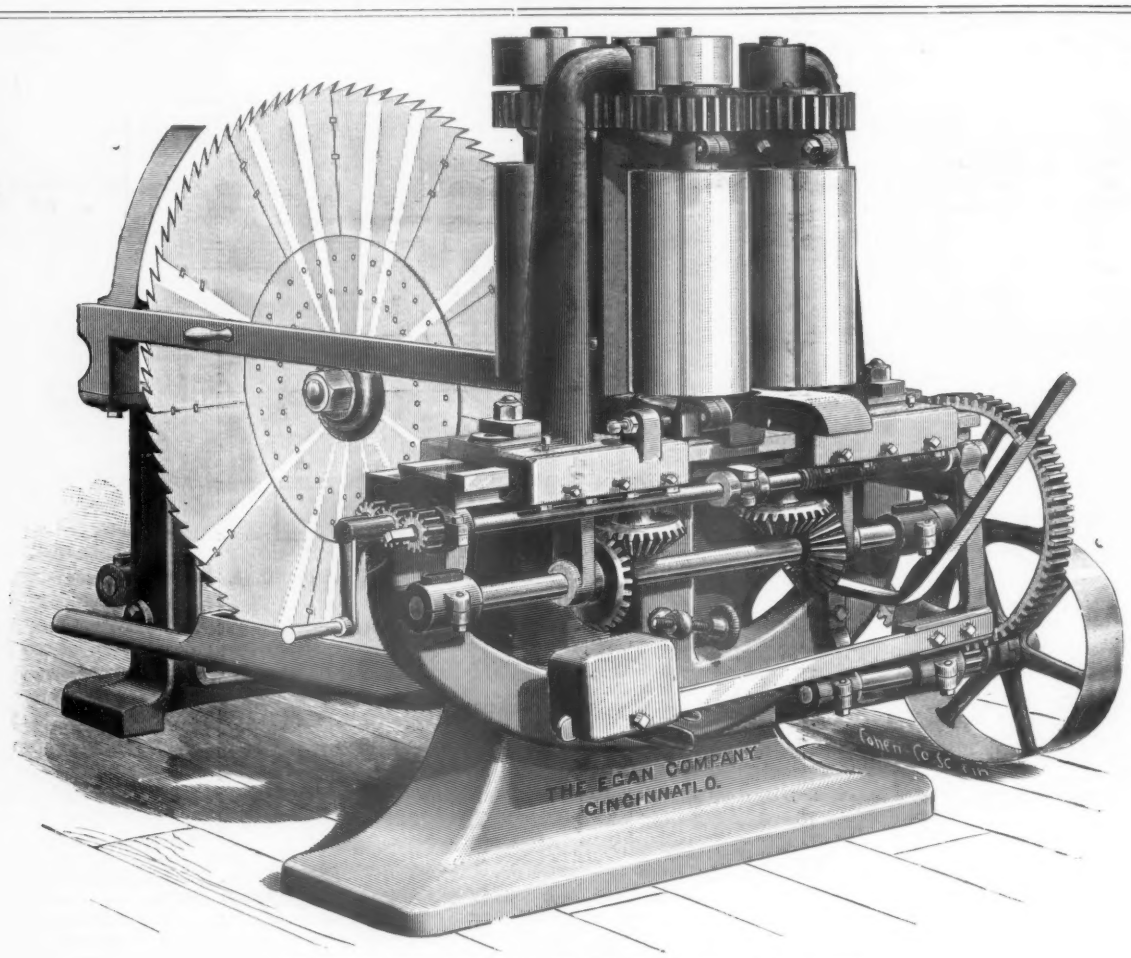
The creosoting plant consists of two creosoting cylinders 6 ft. in diameter each, one 80 ft. and the other 100 ft. long; a vacuum pump, a pressure and oil pump with the necessary pipe connections, a working tank, oil storage tanks, a steam boiler of 60 H. P., a superheater and a hoisting engine.

All parts of the plant are so connected that it can be operated with ease by one engineer and fireman. The creosoting cylinders are made of boiler iron and have swinging doors at each end; they are tested with cold water pressure to 225 lbs. per sq. in. The vacuum pump is capable of producing, at a temperature of 225 deg. in the cylinder, a vacuum of 30 inches. With the pressure pump a pressure of 250 lbs. per sq. in. can be exerted under ordinary circumstances. The superheater is so constructed, that steam of 80 lbs. can be heated to 750 deg. within 45 minutes. The hoisting engine works the derricks and pulls the loaded trucks in and out of the creosoting cylinders.

Through each of the creosote cylinders runs a track, which can be connected with the tracks in the yard by a bridge. At the bottom of the 80 ft. cylinder 1,500 lineal feet of one inch steam pipe are placed and 2,000 lineal feet in the 100 ft. cylinder. These steampipes are connected with the superheater. Both cylinders are connected at the bottom with the working tank by a 6-in. pipe, through which the oil passes in and out of the cylinders. Each cylinder has a dome in the middle, from which they are connected with the vacuum pump, pressure pump and the boiler for the admittance of live steam.

The creosoting yard is divided into two sections, with the creosote works in the middle. In one part of the yard all material for creosoting is received and prepared for the process. It is then loaded on trucks and hauled into the cylinders. After treatment it is hauled out of the other end of the cylinder into the shipping yard, where it is loaded by derricks onto cars or placed on the wharf. The empty trucks are set on a return track and run back to the receiving yard.

The Process of Creosoting.—The material to be creosoted is loaded on iron trucks and run into the creosoting cylinders, the doors of the cylinders closed and steam from the superheater admitted to the steampipes in the cylinder. At the same time live steam is let into the cylinder directly from the boiler. This is continued until the temperature of the cylinder reaches about 250 to 275 deg. Fahr. Then blow-off valves on the bottom of the cylinder are opened and the evaporated sap and steam are blown together out of the cylinder. This process is continued from 6 to 10 hours, according to the condition of the timber and the amount of oil to be forced into it. Care is always taken that during the steam.



FORTY-TWO-INCH CIRCULAR RE-SAW WITH SEGMENT BLADE.
Made by THE EGAN CO., *Cincinnati, O.*

ing process the pressure in the cylinder never falls below 25 lbs. per square inch. This is done to avoid checking of the timber. During this process all the moisture is driven from the timber and the albumen coagulated.

The live steam is now shut off and the blow-off valves of the cylinder closed. Heating through the steam pipes in the cylinder is continued, and the vacuum pump set to work. During the vacuum process all the vapors left in the cylinder and those still produced are drawn out. According to the amount of oil to be forced into the timber the process of exhausting is continued until the vacuum gauge shows from 18 to 28 in. of vacuum. Then the oil, which has previously been heated to a temperature of about 160 deg., is allowed to flow into the cylinder. The cylinder is completely filled with the oil, and if the timber does not absorb the required amount of oil per cubic foot, the pressure pump is set to work and oil forced into the cylinder until the timber has absorbed the specified amount of oil per cubic foot. When this is accomplished the cylinder remains standing with charge in and pressure on, but steam heat shut off, until the pressure gauges return to about 20 or 25 lbs., then the surplus oil is allowed to return to the working tank, the doors of the cylinder are opened, the finished charge taken out, and a new charge put in.

To ascertain during the process how much oil has been forced into the timber I have adopted the following method for measuring: Our working tank from which the oil is taken in the cylinder is a square iron tank, 25 × 40 × 4 ft. Each inch of oil in this tank represents in volume 620 gallons, making allowance for a few obstructions in the tank. A float rests upon the oil in this tank, and an indicator is attached to the float showing, in a convenient place, the exact rise and fall of the oil in inches and fractions thereof. The exact cubic contents of each empty cylinder is known not only from calculation, but from actual measurements. All timber is carefully measured and its cubic contents computed before it is hauled into the cylinder; the cubic contents of the iron trucks is also known; consequently, when a charge of timber is hauled into the cylinder, and the cubic contents of the timber and the trucks subtracted from the cubic contents of the cylinder, the cubic contents of the empty space in the cylinder becomes known. If now the amount of oil which has to go into every cubic foot of timber is added to the amount of oil required to fill the empty space in the cylinder, we have the total amount of oil to be taken out of the working tank during the treatment of that particular charge. For convenience sake the oil is figured in gallons, allowing 8 lbs. to the gallon. The indicator shows the exact amount of oil taken out of the working tank, thus showing the exact amount forced into the timber.

We commenced the manufacture of oil in November, 1887, and commenced creosoting in February, of 1888. Since that time we have treated principally piling for trestles and wharfs, also furnished piling for the extension and repairs of light houses in the Gulf of Mexico. We have furnished the piling for piers for the Plant Havanna Steamship Line at Tampa, Fla., and are now furnishing the piles for wharfs and trestles of the Brunswick & Western Railroad, at Brunswick, Ga. We have also treated a good deal of timber used in repairs of railroad structures and for other building purposes, as sills and joists for warehouses. Such material is framed at our works in accordance with drawings before the treatment, as it is not well to break the surface of creosoted material. We have also furnished a large amount of creosoted cross-ties and guard-timbers for iron railroad bridges. Such ties and guard timbers are notched out before the treatment and shipped ready to be placed on the bridges.

Forty-two-inch Circular Re-saw with Segment Blade.

We illustrate herewith a new circular re-saw with segment blade, which is designed to turn out a great deal of work with the least possible waste in kerf. The makers claim that it can be used to great advantage for all kinds of splitting in car-works, planing mills, furniture factories, etc., where it is desirable that the lumber shall be turned out well up to size. The segment blade takes out but little kerf, is easily kept in order, and both the quantity and quality of work is all that can be desired.

The frame is very heavy and substantial, and is planed perfectly true to receive the swinging feed-roll frame and mandrel boxes.

The feed consists of four heavily geared feeding rolls, with front top rolls for straightening wide boards. The frame which carries the feeding rolls is pivoted on the main frame in such a manner that all four rolls can be adjusted to any angle at once by loosening one hand lock nut; the setting and angling is done by an adjusting screw to facilitate accuracy in adjusting the rolls to any desired angle.

The rolls are self-centering, that is, a board 1 in. thick may be followed by one 1¼ in. thick and both may be split in the centre; or, either pair of rolls on either side of the saw may be made rigid by loosening one hand nut so that slabs of any desired thickness may be cut from a plank. The rolls come within ⅛ in. of the bed plate, allowing strips 1 in. thick to split if necessary, which is an advantage not possessed by many other machines.

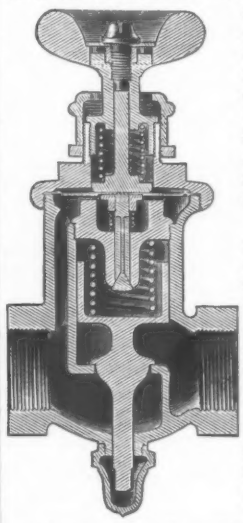
The mandrel is of the best crucible steel of large diameter, running in self-oiling boxes. The pulley on mandrel is placed between bearings, which are adjustable and slide on planed ways to and from the feed rolls to accommodate any size saw, and to bring the teeth of the saw close up to the feed rolls.

The machine is furnished with one 42 in. patent segment taper saw, with large stiffening flanges, or when desired a 42 in. taper ground solid blade can be substituted.

This machine was awarded the medal of superiority at the Cincinnati Centennial. For further information address the builders, The Egan Company, Cincinnati, Ohio.

Improved Pressure Regulator.

The Curtis Regulator Co. has introduced an improvement in its well-known pressure regulator to better adapt it for use in steam heating of railroad trains. The ordinary operation of the regulator will be understood by reference to the cut, which shows a main valve operated by a loose-fitting piston;



a secondary valve in the top of the chamber over the piston; a metallic diaphragm (performing the double office of operating the secondary valve and making a joint to the cap which contains it), and a side passage, connecting the chamber under the diaphragm with the outlet.

When the spring over the diaphragm is compressed, the diaphragm gives way, and thus opens the secondary valve upon which it rests. Pressure being let on, raises the piston, and therewith the main valve, to its full capacity. The main valve remains open until the back pressure communicated from the outlet through the side passage is sufficient to raise the diaphragm, and thus close the secondary valve, when the steam or water escaping around or through the loose-fitting piston fills in the space on top of the piston and forces it toward its seat, thus uniformly maintaining the pressure at which it is set. In heating trains by steam from the locomotive it is desirable to be able to give an extra pressure at first in a cold train, in order to heat up quickly.

The improvement consists in threading the top collar or extension of the cap (which contains the regulator spring) outside as well as inside, and putting on to it a threaded sleeve, having a shoulder, which is adjustable, so that it can be set to stop the movement of the handle in one direction, while the extension of the top cap forms a stop in the other direction.

The extension of the top cap is carried up just so far that, when the top handle is turned down hard on to it, the spring is compressed to produce 50 pounds and *no more* in the steam-pipes. The threaded sleeve is also adjusted so that when the top handle is turned out until it strikes the collar on the sleeve the minimum pressure, say 10 lbs. or 5 lbs., will be produced, and the sleeve when so adjusted is locked firmly to the cap by the lock-nut underneath it.

Therefore, when the engineer connects with a cold train, he can screw down the top handle, and leave the regulator to take care of the pressure. When the train is hot, he can turn back on the handle as far as it will go, and the regulator adjusts the pressure to, say 10 lbs., the normal amount required to keep the train hot: he can make this minimum more or less, by starting the lock-nut and screwing the sleeve down or up; but when once the sleeve is set and clamped, the top handle can be locked by a hard turn against the shoulder, so that no jarring of the engine will disturb it.

The Kanawha River Bridge, Point Pleasant, W. Va.

The bridge which is illustrated herewith was completed last May. It was built by the Union Bridge Co. for the Ohio Valley Construction Co., and takes the Ohio River Railroad across the Kanawha River at Point Pleasant.

The principal dimensions are as follows: Total length of three spans, 960 ft.; each shore span, 240 ft.; centre span, 480 ft.; suspended span, 160 ft.; cantilever arms each, 160 ft.; all panels, 20 ft.; width, centres of trusses, 20 ft.; height of side spans, 44 ft. at centres and 24 ft. at ends; height of towers, 65 ft.; height of suspended span, 24 ft. The bridge is a single track, through, of steel. The top chords of the cantilever arms are eye bars, that ofthe outer or shore arm being 4 bars, each 6 × 1¾ in., and 2 bars, each 6 × 1⅞ in., giving a total cross section of 64.5 sq. in. with an assumed dead load of 324,000 lbs. and a live load of 583,000 lbs.

The chief novelty in the design is in the use of two top chords for the end spans. By this disposition the strains in the lower of the two top chords are all of compression, and those in the upper chord are of tension only. The web system of the shore trusses is lighter than it could be if carried to the upper chord, and in spans of this length a considerable economy of material is made, and the design is not only economical but decidedly graceful.

KANAWHA RIVER BRIDGE.

Built by THE UNION BRIDGE CO., *New York.*

Maintenance of Way.

In what follows we give the substance of a paper read some time ago, before the Engineering Club of the University of California, by Mr. W. G. Curtis, Superintendent of Track and Water Service, Southern Pacific Co.

Mr. Curtis first gave some statistics of the growth of the railroad system and of the number of men employed in track work and of the cost to the country at large of that element of cost of operating, and called attention to the fact that as a result of the immense rapidity with which the railroads have been built, many of the systems of maintenance must be on an experimental basis and subject to radical changes, as the natural increase in earning power of the roads from year to year offers the means for substantial betterment.

Probably the best system, and the one most generally followed, divides the supervisory force between the laborers and the general officers into three or four grades, namely:

1st. Foreman in charge of short sections of track and reporting to a roadmaster.

2d. Roadmasters or supervisors in charge of longer portions of road and reporting to an officer variously styled general roadmaster, division roadmaster, division or assistant engineer.

3d. The subordinate officers last named reporting to a general officer, either directly or through a division superintendent, whose duties include the direction of both maintenance work and movement of traffic.

In most cases this organization covers repairs of bridges and buildings. On 2,850 miles of roads included in the Pacific System of the Southern Pacific Co. the normal force of track laborers is in round numbers 2,000. The average length of the road in charge of each foreman is 9.8 miles, under each roadmaster, 136 miles, and under each division roadmaster about 710 miles. Our division roadmasters, with one exception, are experienced civil engineers, and all report directly to the general office. This organization covers track, water supply maintenance, and such engineering work as is commonly required on completed railroads, but does not include bridge and building work, which is in charge of another department.

As a general rule, vacancies in maintenance service up to and including the position of roadmaster, should be filled by promotion from the laboring force, and division engineers should train men in their staff of assistants to fill higher positions. The brightest men and those capable of doing the best work, should always be picked out for promotion, regardless of the number and claims to consideration of trustworthy but less efficient men who may have been longer in the service of any company. The roadmasters need not necessarily be what we would term educated men, but should be able to express themselves clearly on paper, and should understand something of figures. They should, however, be thorough masters of every detail of track work, great and small, especially of the best methods of quickly opening roads blocked by washouts, derailed trains, snow blockades, etc., etc.; should, by their force of character, command the respect of both superiors and subordinates; should know the men employed under them, thoroughly weeding out the incompetents and encouraging other men to be vigilant and industrious. When, as is generally the case, less material and fewer men are allowed than they would like to have, they should put forth extra exertions, and manage by some expedient to still keep the road under their charge in good order. To accomplish all this, they will, you may be sure, have quite enough to do to keep them out of mischief.

The opinion is quite prevalent even, I am sorry to say, among some railroad officials who lack practical experience in this branch of the service, that track work can be governed by a few simple rules, and readily falls into an endless routine, requiring just about so much money from the company's treasury on a monthly average, and needing no particular skill or attention to direct it. Nothing could be further from the truth. There are abundant reasons for the belief that no branch of railroad service of equal importance so well repays intelligent, unremitting and vigilant supervision by increased efficiency and diminished expenditure of money. Rules of general application for doing work cannot be formulated, for the reason that no two roadmasters' divisions can be alike in every respect, and the requirements of any one division may vary from month to month and from year to year. Take, for example, the Southern Pacific Company's lines to Odgen and to El Paso, along which are encountered the extremes of heat and cold, the lowest winter temperature in Eastern Nevada being sometimes more than 50 deg. below, and the summer maximum not infrequently 125 deg. above zero F., on the Colorado desert in Southern California. Again, we have the extremes of precipitation, from an almost rainless region near Yuma, Arizona, to 120 in. maximum annual rain fall in Shasta County, Cal., and over 63 ft. maximum snow fall near the summit of the Sierras. The line in Southern California and Arizona is also subject to great and sudden damage by cloud-burst storms, against which it is extremely difficult to devise an efficient protection. The elevation of the roads varies from 7,000 ft. above the ocean on the summit of the Sierras to 266 ft. below sea level on the Colorado desert. Finally, the mileage of the rolling stock per mile of road varies on the several divisions, the difference between the lines carrying the lightest and heaviest traffic being as 1 to 50. That many different methods of working must be followed out to accomplish uniform economy in the maintenance of such a system of roads is, I think, perfectly self-evident from these facts.

ROAD BED.

I will call your attention to diagrams representing the Southern Pacific Co.'s standard forms of roadbed.* These, like all of our standards, are made to be followed out, unless, on consultation all round, we decide, for good reasons, to deviate from them. You will notice that the top line of ballast takes a rounded form; that ends of ties are not imbedded in the ballasting, and that the top corner of the embankment is rounded off. On some roads gravel and broken stone is filled up to the level of the top of ties and carried out on this level a few inches beyond their ends, the idea being that it is necessary to do this to keep the track in line. We have found, however, that if the opposite rails are kept up to a horizontal plane on tangents, and a proper super-elevation of the outer rail uniformly maintained on curves, there is no tendency of the track to go out of line, and the advantages for quick drainage, even though the ballast be composed of very porous material, is all in favor of the sloping off, with the ends of the ties left free. In earth or mud ballast this, we think, is the only practicable form, and it is sometimes surprising to note how well track, put up in perfect conformity with this standard, with quite inferior material, will stand through our wet seasons. We round off the top of the slope on embankments instead of trying to maintain them, as usually constructed, with no connecting curve between the plane of the road-bed and line of natural slope, because nature seems to abhor an angle as well as a vacuum; and while water ordinarily falling on the road-bed will drain off from a cross section of this form without doing much damage, the other form referred to is soon destroyed by being gullied out.

BALLAST AND TIES.

Quite a number of materials are used for ballasting, with results varying according to the climatic conditions, etc. Between good broken stone and good clean gravel, not too large, it is difficult to choose; either or both may be the best, according to circumstances. Some kinds of furnace slag is about as good as either. Coal cinders, while rather light for the service and not so enduring as some other materials, answer the purpose very well, and are invaluable for keeping track in surface on earth ballasted lines during wet weather.

On the roads that I am most familiar with, timber generally used for ties is pine of different varieties, cedar, fir, tamarack and redwood. There is a great difference in the quality of the latter. What is commonly called the black redwood, which, as I understand it, comes from the "butt" logs and from the large and slow-growing trees on the northern slopes of hills, is much more enduring than timber cut from higher sections of the same tree, or from smaller and more rapid growing trees. Good cedar ties are probably the best available for our use, but unfortunately the supply is small. Pine ties usually fail from decay, and redwood ties from cutting or crushing beneath the rails. Thus the life of pine ties is quite independent of the tonnage, but varies greatly with the nature of the different ballast, while the life of redwood ties varies with the alignment of the road, the condition of the rail and track and the volume of traffic.

The average life of pine ties on the line of the Central Pacific between Truckee and Ogden has been so far about nine years. The average duration of redwood ties laid in 1871 and 1872 on the Visalia Division, through San Joaquin Valley, was about 11 years, under a traffic of about 1,000,000 tons per annum. These ties were under rather a light iron rail, which has since been replaced with steel, and consequently the life of ties which have been put in for the last two or three years should be considerably greater.

In some light, sandy and loamy soils, between Truckee and Ogden, pine ties decay very rapidly, in some cases lasting only three or four years.

On the mud, alkali and salt flats, through Nevada and Utah and along the northern shore of the great Salt Lake, pine ties, some of them very inferior in quality, laid down in 1868, are to-day as good as new; and I hardly expect to live long enough to see them go out of service. I suppose there are 175,000 of such ties in the track, or enough to lay 60 miles of road. It is possible that ties buried in this soil until thoroughly seasoned may show a long life in localities where ordinary timber decays rapidly. We laid down in 1883 some three car-loads of ties which had been so treated for the preceding 18 months, placing them with new ties of the same kind of timber, and in a little while we shall doubtless get some results.*

At Rose Creek, Nev., we have about three-quarters of a mile of track laid with ties made from different kinds of timber, including four or five hardwood ties from the state of Durango, Mex. The soil is sand and gravel, and sandy loam. We consider there is no point on the line between Truckee and Ogden, where pine ties rot more rapidly than in this locality; but the rate of decay is about the same in different places to an aggregate of about 32 per cent. of the entire distance between those points. The following table shows the condition of sample ties at that place:

STATEMENT OF CONDITION OF SAMPLE TIES NEAR ROSE CREEK, OCT. 1, 1886.

KIND.	When laid.	No. laid.	Taken out previous to 1886.	Taken out of track this season, 1886.	No. in track Oct. 1, 1886.	Condition of ties still in track. Inches of sound wood under rail.	Remarks.
White pine	1879	63	23	16	24	3	
Cedar	1876	97	4	0	93	5½	½ in. cut by rail.
*Cooked cedar	"	57	6	0	51	4½	½ in. cut by rail and 1 in. rotten.
*Cooked red fir	"	11	8	1	2	3	
*Cooked pine	"	20	5	1	14	3	
Cedar	"	50	5	0	45	5½	½ in. cut by rail.
White pine	"	43	8	5	30	3	
Spruce	"	50	20	8	22	3	
Yellow pine	"	45	23	4	18	3	
Sugar pine	"	34	17	3	14	3	
White fir	"	50	11	2	37	3	
Tamarack	"	10	6	1	3	3	
Sugar pine	"	60	44	0	16	3	
Red fir	1877	66	21	0	45	3	
Hewed red fir	"	20	16	1	3	3	
Northern redwood	"	200	0	4	196	4½	Cut by rail 1½ in. (4 removed were split)
Southern redwood	"	240	0	0	240	4½	Cut by rail 1½ in.
Eucalyptus	"	226	147	48	31	3	
Mexican hardwood	1883	5	0	0	5	.....	
Combination ties	1885	25	0	0	25	.....	
Redwood 8 in. × 8 in.	"	25	0	0	25	.....	

Redwood 8 in. × 8 in. ties look as good as last year, except a few that are cut down a little.

*Cooked or soaked in the hot springs near Hot Springs station, Central Pacific.

The combination ties referred to were made by spiking a piece of 2 × 8 in. pine on the top of 4 × 8 in. redwood, the idea being to put the pine on top of tie to resist cutting or crushing the rails, and redwood on the bottom to resist de-

* The diagrams are not given here, as the practice of the road is sufficiently described by Mr. Curtis. In the snow belt the amount of ballast is increased in quantity. The quantities of broken stone or gravel are as follows: General cross section, in excavation, 1,975 cu. yds. per mile; on embankment, 2,014 cu. yds. per mile; in snow belt, 2,309 cu. yds. per mile.—ED

* The following analysis was made by Mr. J. A. Chesnut, member of the Engineers' Club of the University of California, of a sample of soil sent by Mr. Curtis. The soil was taken from the line of the Central Pacific between Desert and Hot Springs, Nevada:

		Per cent.
Magnetic oxide	Fe_3O_4	5.2
Alumina	Al_2O_3	10.92
Silica	SiO_2	38.48
Sodium chloride	NaCl	22.33
Carbonic acid	CO_2	12.65
Sulphuric anhydride	SO_3	.30
Phosphoric "	P_2O_5	.305
Potassium	K	.032
Calcium oxide	CaO	2.10
Magnesium oxide	MgO	.254
Manganese binoxide	MnO_2	.057
Water	H_2O	6.97
Total		99.598

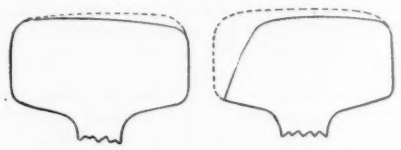
The sample was allowed to stand for some time before analyzing, and the percentage of moisture is perhaps considerably changed from the normal amount. The soil was then fused with sodium carbonate. This analysis shows that the preservative qualities of this soil are due principally to the antiseptic properties of the large percentage of sodium chloride. Also, the sulphuric and phosphoric acids, probably in combination with calcium and magnesium, exert considerable influence in preventing the decay of the wood.

cay. As previously explained, the redwood ties fail by crushing down under the rails from the top and the pine ties by decay from the bottom; the top two inches of pine ties removed from track as useless is generally quite sound. We expect, of course, there may be some tendency of timber to rot between the two surfaces in contact, but should the ties prove serviceable in other respects, it might be cheaply overcome by coating this joint with creosote oil, coal tar or some similar substances. Iron plates of various forms have been suggested as a preventive for crushing of redwood ties under rails, and we have some in experimental use, but are inclined to think those of effective patterns too expensive to justify their general use at current prices for ties.

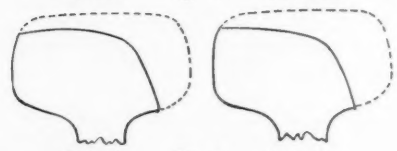
Rails wear better if inclined slightly inward at a rate corresponding with the cone of the wheels. On curved lines it is indeed quite necessary to place the rail in this position; and it is well to do the same thing on tangents. To accomplish this cheaply, there was designed several years ago, by Mr. L. M. Clement, Chief Assistant Engineer, and Mr. Benj. Welch, Master Car-Builder, of the Central Pacific, a machine placed on a car which, at one operation, cuts the ties to even lengths, and bevels a small portion for the rail to rest upon. A force costing about $50 per day will take from pile and pass through the machine and load on cars for shipment about 5,000 ties daily; the total cost of this work thus being one cent per tie, of which much less than half is for the spotting work.

LIFE OF RAILS.

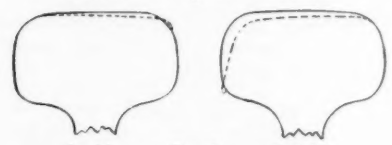
We read that the average steel rail now being produced is of inferior quality as compared with that manufactured in the last decade, but in our experience on this coast we have as yet no data tending either to verify or disprove this statement.



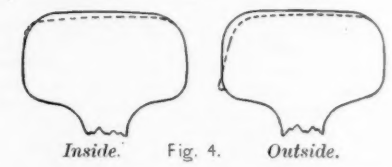
Inside. Fig. 1. *Outside.*



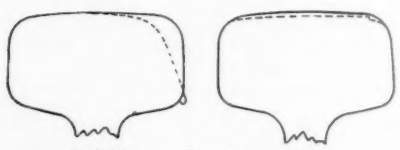
Outside. Fig. 2. *Outside.*



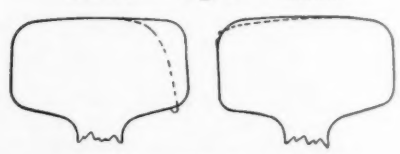
Inside. Fig. 3. *Outside.*



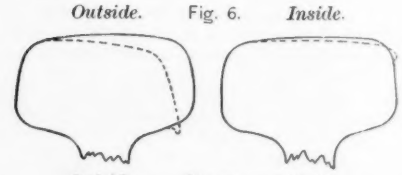
Inside. Fig. 4. *Outside.*



Outside. Fig. 5. *Inside.*



Outside. Fig. 6. *Inside.*



Outside. Fig. 7. *Inside.*

Sections of Worn Rails—Central Pacific.

NOTE.—Fig. 1. Terrenoire (French) steel; 60 lbs. per yd.; laid on 8° curve September, 1872; section taken Oct. 8, 1883.

Fig. 2. Cambria steel; 60 lbs. per yd.; laid on 8° 20′ curve November, 1874; section taken August, 1883.

Fig 3. Scranton steel; 50 lbs per yd.; laid on 6° curve October, 1877; section taken April, 1882.

Fig. 4. Scranton steel; 50 lbs. per yd; laid on 3° curve October, 1877; section taken April, 1882.

Fig. 5. Troy steel; 60 lbs. per yd.; laid on 6° curve March, 1876; section taken April, 1882.

Fig. 6. French steel; 60 lbs. per yd.: laid on 10° curve 1872; section taken April, 1882.

Fig. 7. Cambria steel; 60 lbs. per yd.; laid on 7° curve 1874; section taken April, 1882.

Your attention is called to some sections of worn steel rail, taken in April, 1882, on the Mountain Division of the Central Pacific. Most of the rails shown as being on the outer side of curves have since been changed to the inner side and the inner rail put in its place. The loss per yard, per million tons on tangent, was from 0.017 lb. to 0.085 lb. On the inside of curves from 0.02 lb. to 0.086 lb. On the outside of curves from 0.143 to 0.303 lb. per yard.

Actual sections cut from 50-lb. steel rail show the average wear of rail in 25 miles of track laid on Tehachapi Mountains in 1876 and taken up in 1882; time in use being six and a half years. Total traffic (estimated), four and one-half million tons The total loss per yard from the rail on tangent was 0.485 lb. or 0.11 lb. per million tons. On the inside of a 10-deg. curve the total loss of metal was 0.789 lb., or 0.15 lb. per million tons. On the outside of a 10-deg. curve the total loss per yard was 0 941 lb., or 0.21 lb. per million tons.

Dr. Dudley, the able Chemist of the Pennsylvania Railroad some years ago, investigated the wear of sixty-four steel rails, selected as samples of rails worn down under different conditions. His conclusions were, that other things being equal, the ratio of wear was as follows:

Level tangent and grade tangent as 1 to 1.82; level curve to grade curve as 1 to 1.80; levels to grades as 1 to 1.81. The average grade on tangents being 64.75 ft. per mile; the average on curves being 53.13 ft. per mile; general average on tangents and curves, 58.94 ft. per mile. As to the effect of curves on rail wear, he concluded that the ratio on grade tangents and grade curves was as 1 to 1.82. Level tangents and level curves was 1 to 1.84. General average on tangents and grades as 1 to 1.83, the average curve being $3\frac{51}{84}$ degrees. As to wear on high and low sides of curves, the super-elevation of the outer rail being at the rate of 1 in. per degree of curve, he found grade curves, the low and high sides, say as 1 to 2.19; the level curves as 1 to 1.82; general average of low sides and high sides as 1 to 2.05, the average curve being as before, $3\frac{51}{84}$ degrees.

A great many tests have been prescribed for rails. Some companies require tests of pieces cut from rails; others, chemical tests; others, bending tests of the entire rail; others, drop tests. Some prescribe all of these tests, or different ones in combination. Our rails have generally been bought on guarantee of quality, with no particular test prescribed by ourselves. I know little of chemistry, but one thing seems very clear, that one can get a good chemical analysis as well from a bad wearing as a good wearing rail. The common sense of the whole question seems to be that as rails are required to possess a certain transverse strength and to wear well, the tests should be by bending under a suddenly applied stress, corresponding to the effect of heavy wheels in rapid motion along the rails in track, and the endurance of the metal should be tested by putting two pieces in a machine, held together by certain pressure, corresponding somewhat to the weight on engine and car wheels, and made to rub against each other, and the wear resulting therefrom, compared with the wear of some standard pieces of metal worn under the same conditions; or, the rail might be bent into a circle, and one or more pair of wheels loaded to a certain weight placed upon it, with axles as long as the diameter of the circle, the axles to be fastened at the centre and made to revolve, giving the wheels a speed corresponding with that of ordinary trains, and the results of wear compared as before with some rail of standard quality. In short, the test, if made at all, should be of a practical nature, and should bear some well defined and easily understood relation to the actual service the rails are designed for.

RAIL JOINTS.

We have had very few broken plates during the 14 or 15 years they have been in service on the Southern Pacific Company's roads, and practically none have been broken except on very soft road-bed. I cannot do better than to read you a report from Mr. Thos. Fitzgerald, our Division Roadmaster in charge of the Central Pacific track between Reno and Ogden, a very practical and observing trackman, and from Mr. Ambrose, an equally good observer, in charge of the line between Lathrop and Los Angeles.

Mr. Fitzgerald writes: "I cannot give much information on this subject, for the reason that so few angle plates break on this division, not more than 15 of those reported broken for the past year having been broken under ordinary usage in track, and these break only from being made of bad matertal, and perhaps on account of loose joints. Seeing so much published on this subject, I examined the angle plates longest in use, as well as others, and could find no sign of wear; perhaps they have not been long enough in use, although none of the angle plates put in between Promontory and Blue Creek in 1875 have ever broken, and are as good as new. As you are aware, we have on this division some very solid roadbed and some that is very soft during wet weather. The track freezes solid during the winter; some portion of it is 'heaved' with the frost and gets pretty rough. The heaviest class of engines and trains run over it, and still the angle plates do not break. It may be that in the future a greater number of them will fail, but I do not think so. I cannot understand why angle plates made out of good material and used in track kept in good order can break."

Mr. Ambrose writes: "All the angle plates removed from track on my division during the year were taken out because crooked or broken at low joints and bad ballast, and none on account of derailed rolling stock or other reasons. The ballast which causes most broken plates is mud, which is hard and tough when dry, and soft and sticky or miry when wet. After a cinder ballast was very sparingly applied to some of the worst parts of the road there was not even a low joint.

"The good effects of a ballast which will allow water to pass through it is also well shown in Section 5, Tulare Division, where, after the November rains, some broken angle plates were found at low joints on a short piece of track just south of Poso Creek, where the ballast is clay, while on the remainder of the section, nearly all coarse sand, no plates were broken. We have had no plates broken on curves, except perhaps a very few between Lathrop and Tulare, where they are so light that curvature could have no appreciable effect on joints. Ballast is good on all our sharper curves and also where all our 60 lb. steel is laid, and hence no broken plates can be expected on them.

"None of our plates have been broken on bridges or trestles. In the *Railroad Gazette* I noticed that a correspondent told of plates broken on bridges that were well supported. It occurs to me that these plates were broken by contraction of the rail on a cold night after a warm day, there being too little space in the slotted bolt hole left for contraction. When rails were laid, or, as is often the case, especially where grade of bridge is higher than that of the road at each end, the track crept a little and tension on the plates was more than they could stand. I know that plates are sometimes broken in this way, generally angle plates, because the bolt is larger near the head where it passes through one angle plate, and hence the strain comes first on that plate. This may also be the reason why, with a low joint, the angle plate breaks first, or more commonly than the plain, where a joint is made up with an angle plate on one side and a plain plate on the other side of rail; also, it is because the plain plate is more flexible, bending, as it very often does, without breaking. These bent plates are very common on low joints. We generally take them off and straighten them, or put them on upside down without straightening. The fracture where angle plates break takes place not exactly between ends of rails, and always from the top. The break is generally perpendicular about three-eighths of an inch and then divides into two cracks.

"The fact that cracks are not exactly half-way between ends of rails seems to be good evidence of the truth of the theory for cause of breakage, advanced some time ago by the *Railroad Gazette*, the theory being that when a wheel is just on the end of one rail the top part of plate under it is in compression, and under the end of adjoining rail, top of plate is in expansion; that is, for the instant the plate under the wheel is a loaded span and the plate at other side of the joint a cantilever, and vice versa when wheel is just on the end of next rail; the plate exactly half way between ends of rails being subject only to a shearing strain. Of course this causes a very rapid succession of alternate expansions and compressions in top of plate just under ends of rails and consequent weakness of plate at those points, even though a single continuous strain, much greater than any to which plate is subject, would not appreciably affect it. The remedies are to remove cause of breakage and to make the plates thicker where breaks occur. The first is, of course, the proper way; the joint ought never, if possible, be allowed to become low enough to break."

We space ties for suspended joint, leaving only 6 in. in the clear between joint ties. Some engineers space the ties evenly and place one under each joint. This seems to us wrong in principle. We do not incline much to a supported joint, but when we do use it we space the adjoining or shoulder ties up closely.

We once laid some joints on new track in Oakland in this last-described manner, ran accurate levels over them after they were tamped up, and again at the end of four or five months, when it was found, as it might be expected, that the suspended joints had settled down on an average 8 or 10 per cent. further than the supported joints. The total settling, however, was extremely small in both cases, and better results from supported joints hardly seemed to us at that time to be of sufficient advantage to pay for the extra ties.

Systematic methods in recording all experiments with track material should always be followed out, and books of record, which need not necessarily be expensive or elaborate, should always be kept. We preserve the original profiles of our lines in books having leaves of profile paper, in size about 16 × 24 in., and in these books are entered the location of all steel rail laid, all ballasting done, miscellaneous notes of materials laid for experimental tests, as well as many other things of like nature. We find this a very graphic and extremely useful record.

Selection, Inspection and Use of Cement.*

In this paper I shall endeavor to give a few practical hints in regard to the selection, inspection and action of cement and sand and the methods of mixing and using to produce a good mortar. To obtain a good cement, what shall we specify for it and how shall we inspect it? The following conditions should be specified for it. It shall be of the very best grades of hydraulic cement, to be finely ground and put up in well-made casks and stamped with the maker's brand. It shall be subject to inspection and rigorous tests, and if found to be of improper quality it must be immediately removed from the work. Louisville cement shall stand a tension test of 90 lbs. to the square inch, when allowed to set two hours in air and 48 hours in water. Portland cement shall stand a tension test of 300 lbs. to the square inch, when allowed to set 24 hours in air and seven days in water. When stored, the cement shall be kept secure from moisture and currents of air.

The result of the test would be more satisfactory if the cement was given a longer time in water, but the difficulty of a long test is keeping cement enough on hand to last so long ahead. It is almost impossible to make a contractor provide a shelter for cement that is any way secure from damp currents of air, moisture from the ground and even rain. Hence a cement that is very good when tested may

*By S. F. Burnett, Member of the Engineers' Club of St. Louis. Reprinted from the *Journal of the Association of Engineering Societies.*

be poor by the time it is used, if too long a time is taken for testing.

Cement is often tested at the mill, where it is made, as it is put up in barrels, but I very much prefer testing it on the ground where it is to be used. The simplest method of inspecting cement, and one that I have found to work nearly every time, is simply by examining barrels. If the barrels are new and clean, with any marks on them, and the brand is one that you are familiar with, and know to be good, then it is pretty safe to say the cement is good. On the other hand if the barrels are old and dingy, with holes plugged up in the ends of some of them, and marks on many of them, or if the barrels are old and the heads new, or newly scraped and newly branded, then beware of the cement, and do not let any of it be used until you have given it a full and rigorous test. Where the barrels are new and clean, and of a good brand, I would not be afraid to let the cement be used at once if I was in a hurry for it; but the regular modes of testing should be gone through with before the cement is used, if the time is not too pressing. This inspection of barrels applies only to Louisville cement. Nothing can be told from the barrels of Portland cement, nor from the brand either, as they vary so much.

In most cases the cement should be mixed as nearly to the same consistency and worked as nearly the same length of time as possible. The cement should be mixed to about the same consistency of the mortar for which it is to be used; it should be well worked for about a quarter of a minute. Very little more water added, with less working, will diminish its strength considerably. The following is a case showing about the extreme difference that can be made in the method of mixing. Sample of Louisville cement, Queen City Star brand; first sample was mixed very dry, or stiff, and pressed into the molds, the second sample was mixed to ordinary consistency, and third sample was mixed very wet. All were allowed to stand ten days in air. The dry sample broke at 420 lbs., the ordinary one at 276 lbs., and the wet one at 115 lbs. The weights of these samples were 19, 18 and 15½ respectively, thus showing that the more cement in the section the stronger will be the section, other things being equal. With Portland cement the method of mixing does not make nearly so much difference. Portland cement will reject nearly all surplus water.

From the above experiment it will be seen how easy it is to make 5 or 10 lbs. difference at will. It is very necessary to have the molds of exact shape, and great care should be taken in making the briquette; it should not be removed from the mold until it is hard and perfectly rigid. This care is necessary to insure a perfectly shaped briquette; if the briquette is not perfectly shaped the amount of its tension test will be considerably less.

This method of testing *neat* cement, although about the best there is, is rather unsatisfactory, as the cement that is the strongest when mixed neat, is not always the strongest when mixed with sand. For instance, take any good cement and sift it through a No. 60 sieve. In nearly every case this sifted cement, when mixed neat, will not be as strong as the original unsifted cement mixed neat; but when each is mixed with one or two parts of sand, the sample having the sifted cement in it will invariably be the stronger. The following are a few cases to illustrate: Sample of fern leaf cement stood a test of 225 lbs., setting 30 days in air. This cement sifted through a No. 60 sieve, 75 per cent. passing through. Sifted cement stood a tension test of 217 lbs., setting 30 days in air; 8 lbs. less than original cement. Original cement, when mixed with two of sand, stood 33 lbs. Sifted cement, when mixed with two of sand, stood 37 lbs. When mixed with one of sand the original stood 79 lbs. and sifted 120 lbs., all setting 30 days in air. Another example: Queen City Star, setting 2 months in air, stood a tension test of 363 lbs. Sifted through No. 60 sieve, coase stuff ground so as to all pass through, setting 3 months, stood 327 lbs. This cement then sifted through No. 130 seive, coarse stuff being rejected, setting 3 months, stood 295 lbs. Original cement, with one of sand, stood 125 lbs. Sifted through No. 60 sieve, with one of sand, stood 126 lbs. Sifted through No. 130 sieve, with one of sand, stood 182 lbs., all setting 3 months in air. From these experiments it appears that it is very desirable to have a finely ground cement, or more properly a cement with very little coarse stuff in it. The following is an example showing the action of this coarse material compared with sand. Queen City Star cement setting two hours in air and 48 hours in water stood a tension test of 129 lbs. This cement sifted through a No. 60 sieve, 81 per cent. passing through and 19 per cent. rejected; 19 per cent. of sand was then added to the fine portion and tested. It stood 125 lbs. with the same time of setting. I then tried adding 19 per cent. of sand to the original cement. It stood only 92 lbs. with same time of setting. The original cement with two of sand stood 56 lbs.; the sifted cement with two of sand stood 80 lbs., both setting three months in air. This coarse material is a light substance, much lighter than the cement. It is probably ashes and the part of the stone from which the cement was made, that was not adapted to making cement. Portland cements contain very little of this material. Some of this coarse stuff from an excellent Queen City Star cement was ground, and passed through a No. 100 sieve, set three months, and stood 80 pounds. Original cement, setting 36 hours, stood 95.

A slow setting cement generally becomes stronger in the end than a quick setting cement. They are much easier to use and for most work preferable. About the best cement ever tested by myself took sixteen hours setting before it was hard enough to remove from the mold. This cement, setting 16 hours in air and 24 hours in water, stood 367 lbs. Same cement, setting 16 hours in air and 48 in water, stood 451 lbs. A third sample of same cement setting 30 days in air stood 554 lbs. A sample of Indiana blue stone, with ⅔ of the section stone and ⅓ Portland cement, stood 560 lbs., only 6 lbs. more than cement. Adding a very small quantity of sugar to cement retards the setting of it very much.

A cement that will set in 10 or 15 minutes with pure water will take an hour to set if a little sugar be added to the water. Whether this increases the strength of the cement or not in the end I am not prepared to say. I am inclined to think that it does. I know it is weaker after setting eight days. But this is no reason why it should not be stronger after a month. If the sugar does not act chemically on the cement, then its mechanical action, by retarding the setting, should increase its strength.

From the foregoing we will assume that we can get a good cement. Having a good cement we will not get a good mortar unless we have a good sand and the two are properly mixed and worked with the proper amount of water. The sand is much easier tested than the cement. Its quality can always be determined by its looks, feel, etc. The sand should be clean and sharp (I do not think necessarily coarse, although it is generally so required). Both sharpness and cleanliness may be tested by taking a handful of the sand in its moist state as it comes from the barge and pressing it together with the fingers. If the sand is good it will not stick together but immediately fall apart when the pressure is relieved. If it sticks together it is probably loamy or dirty, and is not good. Sand may also be tested by crushing a handful near the ear; if it is clean and sharp it will have a grating sound. It may be further tested for cleanliness by washing a little in the palm of the hand; the hand should be left clean. It is almost as necessary to have a good sand as it is to have a good cement. The effect of poor sand is shown by the following using the same cement and different sands: One of cement and two of good sand setting four months stood 73 lbs. One of cement and two of poor sand setting same time stood 60 lbs. One of cement and one of good sand setting four months stood 115 lbs. One of cement and one of poor sand setting four months stood 72 lbs.

Now, having a good cement and a good sand, it is still necessary to use much care in the mixing and using to get a good mortar. The water is also of some importance; it should be free from grease. In making mortar the sand and cement should always be measured, either in barrels or some other vessels, and not by the shovelful, as most mortar men want to measure it. An excellent method for measuring the sand is as follows: Knock both ends out of a cement barrel and cut it crosswise through the middle, set the half barrels in the mortar box, big end down, and fill them with sand, lift them off of the sand and repeat the operation until enough sand is in the box for a barrel of cement. Then dump in a barrel of cement. The sand and cement must be thoroughly mixed while dry, until the whole mass is free from spots of cement or sand, and is of an even color throughout. The dry mixture is then shoveled to one end of the box and water poured in the other end. The sand and cement is drawn down with a hoe, small quantities at a time, and well mixed with the water until enough has been added to make a good stiff mortar. This should be vigorously worked with a hoe for several minutes to insure a good mixture. The mortar should then leave the hoe or trowel clean when drawn out of it; very little should stick to the steel.

This mortar should then be used as quickly as possible. The consistency of the mortar depends somewhat on the kind of work on which it is to be used, and on the estate of the atmosphere. For a material that absorbs very little water, such as granite, a stiff mortar should be used; for a material that absorbs much water, such as brick, a thinner mortar should be used. In cool, damp weather a stiff mortar should be used. When a stone or brick is once well set in mortar (say for half an hour) it should not be disturbed; if it is necessary to move it, no matter how little, it should be taken up, the old bed of mortar scraped up and thrown away, not remixed and relaid, and a new bed of mortar laid.

In making mortar the amount mixed at a time depends on the rapidity with which it is used. It is very important that it should not be mixed faster than it is used; any mortar that has been mixed one hour is almost worthless. Using Louisville cement, the following are examples to illustrate: Fresh mortar setting three months stood a test of 60 lbs. Same mortar remixed after standing one hour, setting three months, stood only 33 lbs., 27 lbs. less. Another case of fresh mortar setting four months stood 62 lbs. This mortar remixed after standing one hour setting four months stood 40 lbs., 22 lbs. less. With a Portland cement, which is generally much slower setting, the mortar can be kept much longer; but I think the sooner it is used after being well mixed and worked, the better the result. A cement mortar made of one of Louisville cement and two of good sand, should stand a tension test of not less than 50 lbs. to the square inch when setting three months in the air. This is very low compared with some accounts of mortar made of German and English Portland cements with three of sand. A table published by Erskine W. Fisher, of New York, of German cements, the average of nine samples of different brands with three parts of sand, setting one month, was 365 lbs. But we get no such cement or mortar here. The cement mortar used on the granite work of the new standpipe of this city averaged 64 lbs., setting four months. This average was of 16 samples taken out of the mortar box from which it was being used on different days. This is about as good mortar as is generally used. So much for the quality and strength of cement mortar.

In my experience I have found that freezing of mortar before it is well set always weakens it, at least. A mortar laid in freezing weather may turn out very good; but I do not think it is ever as good as it would have been had it been laid in warmer weather. If a mortar has a few hours to set before freezing (say during the day and freeze at night) the effect is not nearly so bad as if it should freeze as soon as laid. Again, if the mortar freezes as soon as laid or shortly after, and then remains frozen for several days (until it has dried) the effect is not so bad as it would be should it thaw within one or two days after freezing. The following are some experiments showing the effect of freezing. Sample of Queen City Star cement, mixed neat and setting in moderate temperature stood 421 lbs. Same cement allowed to set 15 minutes, and then frozen and kept frozen several days, stood 290 lbs. Same cement frozen as soon as mixed, and kept frozen several days, stood 260 lbs. Same cement frozen as soon as mixed and thawed out next day, stood 88 lbs. All these samples set 2½ months in air. Sample of Black Diamond cement setting without freezing, stood 410 lbs. Frozen as soon as mixed, and left exposed to weather, stood 121 lbs. Frozen after setting 15 minutes, and left exposed to weather, stood 163 lbs. Frozen after setting 30 minutes, and left exposed to weather, stood 197 lbs. One of this cement, and two of sand, set without freezing, stood 142 lbs. One of this cement and two of sand, frozen after setting 1 hour, stood 65 lbs. From these experiments it appears that freezing of mortar before it is perfectly set can do nothing but injure it.

The question has been asked: "Does mortar shrink or expand while setting?" I made a number of experiments to find out, and the result of my experiments is that I think it does neither to any appreciable extent. Mortar does swell, however, when immersed in water after it has set. This I proved beyond a doubt by filling a number of lamp chimneys with different mixtures of mortar, making duplicates of each mixture. After the mortar was well set I immersed one of each kind in water, leaving the other in air. In every case the ones immersed in water began to crack, some of them within one or two days after immersing, while others did not crack for one or two months. Most of them cracked all over, cross ways and every other way, so that some of them became a perfect network of cracks. A few of them had only one or two long cracks from one end to the other; these were the ones that cracked last. All the glass remained in place as long as the chimneys were kept in water, but when they were taken out and the mortar allowed to dry, nearly all the glass fell off, thus tending to show that the mortar shrunk back to its original size. In no case did the chimneys crack while left in air. Some of these, after setting four or five months in air, I put in water. They began to crack in the same manner as the others. This swelling seems to be somewhat similar to the swelling of wood when it becomes wet.

In no case did the mortar show any sign of shrinking before it had been immersed in water, or after being immersed in water, but only after it had been taken out it appeared to shrink back to its original size.

All statements made in this paper are based on the results of actual experiments. At least ten experiments of each kind were made, and a conclusion drawn from the average of the results. The experiments given in this paper as illustrations are all average experiments.

THE SCRAP HEAP.

Notes.

The corner stone of a new union passenger station was laid at Ogden, Utah, Nov. 5, with imposing ceremonies. Excursion trains were run from Salt Lake, and business in the town was suspended.

Trains were delayed, and many telegraph lines destroyed in Northern Kansas on Nov. 9 by a severe snowstorm.

A San Francisco dispatch states that the Southern Pacific is having built a new train of vestibuled sleeping, dining and ordinary cars, which will be run as a fast through train once a week each way between San Francisco and Omaha. It is stated that the train will run through in 60 hours.

The strike of yardmen on the New York Central at Albany was raised Nov. 9. Dispatches state that the men received the advance in wages, from $40 to $45 per month, which they demanded. The strike lasted long enough to create a blockade which it was said it would take a week to relieve.

On Nov. 13 about 100 brakemen on the Louisville, New Albany & Chicago struck at Lafayette, Ind., demanding an increase of pay from 1.8 cents to 2 cents per mile, and also that there be three men on each train instead of two.

The Georgia Railroad Commissioner's Report.

The report of the Railroad Commissioners of Georgia for the year ending Oct. 15 has just been filed. The number of miles of new railroad built in the state during the past year is given as 445½. For the year previous the new mileage was 272½. It is stated that these figures are not quite complete. The Commission has during the past year furnished freight rates and passenger tariffs to five new railroads: The Savannah & Tybee, Atlanta & Florida, Covington & Macon, Georgia Southern & Florida, Chattanooga, Rome & Columbus. The Commission reviews the questions concerning rates, rights of passengers, etc., which it has been called upon to decide during the past year. The voluntary reduction of passenger fares on the Western & Atlantic is referred to, and the Commissioners believe a similar reduction of passenger fares on lines operated under like condition and circumstances will not only benefit the public, but prove remunerative to the railroads. The value of railroad property in the state is stated at $29,304,127, an increase of 18 per cent. over the previous year.

A Result of the Accident to the Czar's Train.

Prince Imeretinsky, President of the Military Tribunal, will become Minister of Railways in place of Admiral Possiet, who was dismissed because of the recent accident to the Czar's train.

From Paris to Constantinople by Rail.

The first through express train from Paris arrived at Constantinople Nov. 10.

America in Siberia.

A St. Petersburg dispatch of Nov. 11 says that an American syndicate is about to be formed for the purpose of building railroads in Siberia. Besides a large subsidy, the Government will give 4,000,000 roubles yearly for the transportation of mails and convicts.

German Railroads.

The *North German Gazette* says that, owing to the increased traffic, the Prussian government has ordered the construction of 7,000 new goods wagons and has hired 1,500 wagons from abroad. It will also ask the Landtag to vote 45,000,000 marks for the purpose of increasing the rolling stock of the railroads.

The Value of Testimony.

An Illinois Central official collected 15 people at a highway crossing to see a sign put up, and a train went past. Next day six of the people swore that the train whistled, three were doubtful, and the other six swore that it didn't.

Imports of Railroad Iron.

The statement of the Bureau of Statistics for the month of September shows that for the nine months ending Sept. 30 the imports of steel rails amounted to 53,597 tons, valued at $1,277,099, or an average of $23.82 per ton, against imports of 95,621 tons, valued at $1,959,006, or an average per ton of $20.48 for the same nine months in 1887, an increase in the average value per ton of $3.34, or 16 per cent., but a decrease of 42,025 tons, or 43.9 per cent., in the quantity imported.

A Troublesome Piece of Road.

About 11 miles from West Superior, on the Eastern Minnesota Railway, a sink hole has caused great difficulty since the opening of traffic. Three weeks ago the bed of the road sank to such an extent that the track for 100 ft. lay 10 or 12 ft. below grade. Business was suspended for about 36 hours, but a large force of men was put at work leveling up the track and business was resumed. Since that time about 800 cars of gravel were dumped within a space scarcely 100 ft. long and 75 wide, and a large force kept constantly employed to keep the hole filled to the grade, but despite all efforts the bed continues to sink, and the track is now about 5 ft. below grade for at least 50 ft. Traffic on the road is not interrupted, but the expense of repairing the grade daily is great.

The Wrong Station.

A passenger on a train from New York the other day, stepped from the over-heated car to the platform and filled his lungs with the fresh, pure air. "Ah," he exclaimed, "isn't this exhilarating?" "No," returned the laconic brakeman, "this is Berlin!"

The Polite and Courteous Critic.

Mr. —— invites engineers to give their free and unbiased opinion of his invention, which he mentions is not patented, but is offered free to the world for the benefit of mankind. Being thus cordially asked for our opinion, we would rise to remark that it is one of the stupidest proposals we have ever heard of, and that its author is some pretentious ass who presumes to teach people wiser than himself, since his scheme proves that he knows nothing of the principles of mechanics or of the other laws of Nature.—*National Car-Builder.*

Wonderful Vitality.

In these days of scientific discovery little surprise is felt at the survival of microbes and other low organisms under apparently trying conditions. The manner in which certain newspaper items survive and circulate, certainly indicates that some constitutional similarity exists between low forms of life and the scientific item in the daily press. An illustration of this fact is found in a paragraph which has recently bobbed up serenely and often in our exchanges, and starts off as follows: "At the Baldwin Locomotive Works there are in course of construction four locomotives which are designed to run by soda, which takes the place of fire under the boiler."

These engines were built in the Fall of 1886, and were employed on the Minneapolis Lyndale & Minnetonka, where they were unfortunately unsuccessful, and their use was discontinued early in 1887. We believe that none have since been built in this country, and certainly not at the Baldwin Works. A great deal was expected of their soda engines, but few ventured to hope that they would be resurrected nearly two years after their decease.

RAILROAD GAZETTE

Published Every Friday,
At 73 Broadway, New York.

EDITORIAL ANNOUNCEMENTS.

Contributions.—*Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and in their management, particulars as to the business of railroads, and suggestions as to its improvement. Discussions of subjects pertaining to* ALL DEPARTMENTS *of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.*

Advertisements.—*We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay,* EXCEPT IN THE ADVERTISING COLUMNS. *We give in our editorial columns* OUR OWN *opinions, and those only, and in our news columns present only such matter as we consider interesting, and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes, etc., to our readers can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially, either for money or in consideration of advertising patronage.*

The Lake Shore express locomotive which we illustrate in this issue is a fine example of the most modern style of American engine for passenger service. It is especially noticeable for the very high pressure carried, which is considerably in excess of that usual not only on locomotives but on any variety of steam engine. Modern marine engines now carry even higher pressures than locomotives, but even at sea a pressure of 180 lbs. above the atmosphere is unusual. The example set, however, by Mr. Stevens and Mr. Lauder seems likely to have many followers, as their experience certainly appears to show that many advantages are gained where proper precautions are taken against the evil effects of high pressure steam. The boiler work, of course, should be excellent, but there is no insuperable difficulty in making locomotive type boilers to stand even higher pressures. The greatest difficulty hitherto found has been in the lubrication of the internal working parts, but any tendency to cut and score under the combined pressure and heat of such high pressure steam appears to have been overcome by the use of balanced slide valves, sight feed lubricators and other appliances for reducing friction.

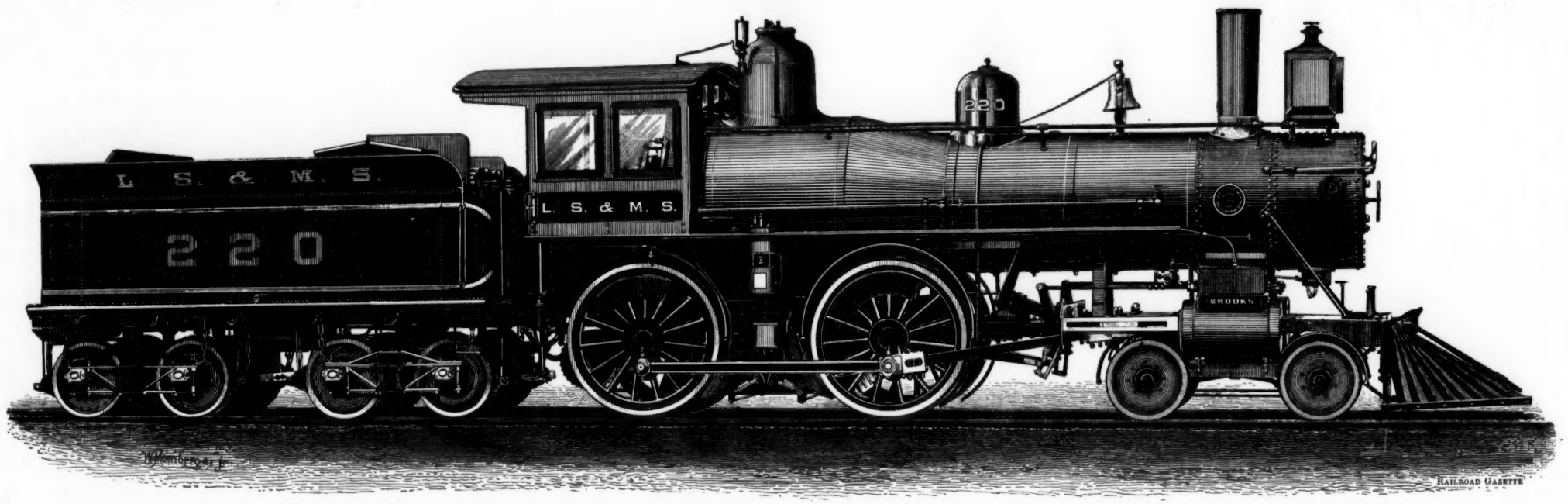
The information that the Chilian Government has made an agreement with a syndicate of New York engineers, contractors and capitalists, under which the syndicate is to build and equip in that country something over 700 miles of railroad, is of uncommon interest. Very briefly the matter is this: The American company will build, equip and turn over to the Chilian Government some dozen different lines, varying in length from 20 to 240 miles. Nearly half of the whole mileage is to be 5 ft. 6 in. gauge and the rest metre gauge. The minor lines are to be completed in two years and the whole in five years. The contract is, we understand, made on a basis of a lump sum for each line, and not on a mileage basis. The contract includes a considerable amount of equipment as well as shops, turntables, etc., and there will be some important bridge work. The original appropriation was $35,000,000 Chilean paper money, equal to about half that sum here. A further appropriation was made, however, as it was found that the first sum was insufficient. Such are the main features of a brilliant enterprise which has been initiated with remarkably little noise. The standing of the contractors on the one hand, and the excellent credit of the government on the other, give reasonable assurance that the projects will be carried out as promised. Indeed, it is quite possible that they will be enlarged beyond the present contract, for the Chilian Government has, we believe, already asked the contractors to make surveys for 600 miles more of road. How much of the material for the new lines will go from the United States we have no means of knowing, and it is doubtful if the contractors themselves know yet. The rails will undoubtedly be bought in Europe and also much of the bridge material and other iron work. But it is intended, and certainly desirable, that the rolling stock should be built here. We do not believe that the best results of American railroad engineering can be obtained without using American equipment. The engineers in the most important positions will go from the United States; but Chili has a good many engineers of training and ability, and the subordinate places will probably be largely filled by them. On the whole, this enterprise promises to offer the most important foreign market for railroad material, and for professional skill and business ability, of any single scheme that has come up for many years.

The New York Central has made a decided reduction in freight rates, and has been met by the Pennsylvania. The effect upon the general scale of trunk line charges will be considerable; but it is easy to exaggerate its immediate importance. Thus far we have nothing which can properly be described as a railroad war. It is not a contest of financiers inspired by mutual rivalry, but a reduction of rates as a measure of traffic policy. The South Pennsylvania, which is regarded by some people as the chief of the whole movement, seems to have nothing to do with it. In fact, it is misleading to describe it as a war between the New York Central and the Pennsylvania. If there are strained relations anywhere, it is between the Central and some of its weaker rivals who are suspected of not fully maintaining published rates. It often happens that a strong road, like the New York Central or the Pennsylvania, deems it a useful defensive measure to reduce rates. The low operating expenses of such a road put it in a better relative position under a system of low rates than a rival whose expenses are higher; and above all, they leave that rival a smaller margin of profit within which it can cut rates as a means of securing traffic. Many of the present low rates are due to the fact that the Pennsylvania has habitually taken this view of the matter. The New York Central is simply carrying the same process a little further. Whether the Central is wise in its manner of so doing remains to be seen. There is an indirect loss to all railroads, due to the incidental demoralization of rates, when a strong company begins to act by itself instead of through the recognized channels of a traffic association. But this result is to be looked at as a possibility rather than a certainity.

We see some attempts to reconcile the apparent discrepancy between the fact that the railroads are fighting for freight and the oft-repeated statement that cars are scarce and shipments crowding in faster than they can be handled. But the difficulty is probably not a great one. The surplus of freight consists largely of coal and lumber. Box cars may be plenty at eastern termini and not help the coal traffic at all. East-bound traffic is always enough heavier than west-bound to make it desirable to increase the latter as long as the least bit of profit can be made upon it. The cutting west of Chicago is largely in live stock, and there has been no scarcity of stock cars we believe. The low rate on grain maintained by the Pennsylvania has been explained by the statement that grain shipments are not heavy, and that the extensive shipping facilities at Philadelphia (not to mention the ocean steamers in which that road is interested) would entail a heavy loss if kept idle. Pressure upon consignees to unload bulk cars doubtless does not keep pace with the increased need of cars; and, indeed, there are probably some kinds of traffic on which rates have been forced so low that managers are glad to escape carrying it. When this kind of freight offers, cars which are on foreign roads where they may get profitable loads back are not hurried home empty for the purpose of accommodating it.

The emigrant rate case has turned out in favor of the railroads, the Inter-state Commerce Commission having declined to interfere in the matter. The case really involved two distinct questions; first, whether the complainant was done an injustice in being hampered in his efforts to sell tickets to immigants, and second, whether the immigrants themselves were treated with injustice in being charged too high rates. For the first of these points it appeared that the Commissioners of Emigration were responsible more than the railroads; and being a New York state body, they were quite outside of the control of the Inter-state Commerce law. More than that the Commission seems to hold that the Emigration Commissioners were justified in their action. Unless some care is taken, immigrants become the prey of boarding-house runners and sharpers. To avoid this evil, regulations were provided for landing them in Castle Garden, and furnishing them with arrangements for western transportation at that point. In these arrangements, it was impossible to give every one free access to the immigrants without creating such confusion as to defeat the ends in view. These were best secured by a special arrangement with the railroads, putting the matter in their hands. Not that there would have been any harm in admitting Mr. Savery, the complainant in the present case, to Castle Garden; but if he had been admitted, a hundred others also must have come in at the same time. The exclusive arrangement with the railroads, so far from being against public policy, was necessitated by the circumstances of the case. It remains to consider whether the railroads took advantage of this monopoly to charge extortionate or discriminating rates. The Inter-state Commerce Commission does not think that this part of the complaint was proved. The extra baggage arrangement, which gave the greatest force to the charge, has now been modified for the advantage of the immigrants. With regard to the complaint that facilities were not what they ought to be, the Commission holds that it was justified in some cases, particularly on the West Shore; but an improvement is promised in these respects, and no order has been made in the premises. It must not be supposed that the business itself is in a wholly satisfactory state. On the contrary, there seems to be from time to time a good deal of underhand effort to secure it by questionable devices. The immigrant business is the one where the effects of competition are seen at their worst. The buyer of the ticket, in the majority of cases, has little or no power of independent judgment; so that the reduction or rebate made by the roads is often not so much for the immigrant, as for the man who influences his selection. The evil of paying commissions is thus seen in its worst form. The special arrangement with the Emigration Commissioners takes away most of the chance to pay commissions but not the temptation to do so. When it works best, it produces substantially the same results which could be obtained by a pool, but it involves much more friction and mutual suspicion and must for that reason be less satisfactory.

The control of the Hartford & Connecticut Western by the Poughkeepsie Bridge interest leaves the New York & Massachusetts with both ends in the air, but, nevertheless the bridge company and the owners of the New York & Massachusetts have not been able to make terms. The bridge company has been unwilling that its Eastern connection should depend upon a mere traffic agreement with an independent road, and the New York & Massachusetts Company has been unwilling to part with the ownership of its line. The result now threatens to take the form of two lines east from the river. The New York & Massachusetts is said to have leased the Newburg, Dutchess & Connecticut, and to be about to build from Boston Corners to Chicopee. Of this, however, we get no confirmation. On the other hand, it is said on good authority that the bridge syndicate has let a contract for building about 26 miles, to a connection with the Hartford & Connecticut Western, which it controls, and that the new line is to be completed by Feb. 1. West of the river the same syndicate is building about 29 miles to Campbell Hall, where connection will be made with the New York, Lake Erie & Western, the New York Ontario & Western and the Wallkill Valley. This line is to be completed by Jan. 1. The intention now is to have the bridge and its approaches and connections ready for operation by Feb. 1. The lines of the syndicate are the Hudson Connecting Railroad, from Campbell Hall to the bridge, the Poughkeepsie Bridge Railroad, Poughkeepsie & Connecticut and the Hartford & Connecticut Western. It is said that the Pennsylvania, Slatington & New England remains entirely outside of this combination. By the completion of the line to Campbell Hall the bridge syndicate will connect directly with one of the greatest coal carriers, the Erie. In 1887 this road carried 8,789,158 tons of coal, and for 10 years this element in its traffic has been increasing steadily and rapidly. In 1887 it was 208 per cent. more than in 1878, and nearly 10 per cent. more than in 1886. By the Campbell Hall line the bridge route connects indirectly with all the great coal roads. By two branches of about 10 miles each from Campbell Hall it can connect with the Lehigh & Hudson, and with the New York, Susquehannah & Western. Possible traffic routes are thus opened between the coal fields and New England, by which much of the coal which now goes to various ports



EXPRESS LOCOMOTIVE, LAKE SHORE & MICHIGAN SOUTHERN.

Built by THE BROOKS LOCOMOTIVE WORKS, *Dunkirk, N. Y.*

Designed by Mr. G. W. Stevens, Supt. Motive Power.

may be diverted to an all-rail route. This, of course, is the expectation of the owners of the bridge, and they hope by the saving in time and in handling, to offer such inducements as will secure for them a very important part of this business.

Probably no other railroads in the world, certainly no others in America, are subjected to such constant and close criticism in matters of operation as are the elevated roads of New York. They are under the eyes of an army of reporters, and everything affecting their comfort, convenience and safety is of direct personal interest to a vast number of the readers of the New York dailies. Consequently, every mishap on the elevated roads becomes the topic of lively comment. A few days ago a passenger tried to board a moving train after the gates were shut. The passenger clung to the gate; the guard refused to open it, and the passenger was carried against the end rail of the station platform and crushed between it and the car. The guard's excuse is that his orders were imperative not to open a gate after the train was in motion, and the newspapers, with hardly an exception, so far as we have noticed, condemn the management for permitting no variation from such an order. The case was certainly a hard one. If the guard had at the last moment opened the gate and saved the passenger it is probable that the violation of the rule would have been winked at, but on a little reflection, it will be seen that the rule is one which is absolutely necessary and one in which it is dangerous to leave any discretion to the guards. Half a million passengers are carried daily by the elevated roads. At certain hours, the station platforms are crowded with people eager to get aboard the trains. Most of these people have now learned, through the existence and rigorous enforcement of the rule closing all gates before the trains are started, that it is absolutely useless to attempt to board trains in motion. It makes no difference whether or not they realize the danger of such attempts; they know that they cannot succeed. But were there any laxity in the matter, were the gates sometimes opened for the reckless or the pertinacious, accidents like that in which poor Baer met his death, instead of being extremely rare, would become common. Undoubtedly the management would like to instruct its guards to always open a gate rather than kill a passenger, but who could decide when the instant had come at which such action was necessary to save the passenger's life? How could the guard know that the passenger would not let go before coming to the end of the platform? The rules of a railroad must be inflexible. They may not be the best or the wisest that could be framed, but the greatest security can be got only by strict obedience to them. On the other hand, these rules cannot be as inflexible as the laws of nature. They are framed for passengers who are mentally and physically capable of taking care of themselves, and the railroad company is bound to employ men who are sufficiently intelligent, humane and alert to protect those who are drunk, insane, stupid or otherwise unfit to travel. Without pretending to pass on the merits of the Baer case, we have thought it well to present certain considerations which are generally ignored in the discussion of it.

We publish in another column a letter from Mr. Blodgett controverting our statement that automatic distant signals at stations are erected in such a way that they partake of the nature of a home and a distant signal, both. But the facts as stated by Mr. Blodgett only confirm what we said. The first and main reason for erecting such a signal is to notify a train approaching at speed that another train is occupying the track ahead of it. To accomplish this the rail-circuit is made to extend through the station yard and to a point some 2,000 ft. to the rear or in the direction of approaching trains. At the end of this 2,000 ft. stands the signal. Now, why is this signal placed so far away? Obviously to give its warning some distance from the obstruction. The average train to be protected is not 2,000 ft., nor 1,000 ft. long. The occasions when two or more trains are to be protected are comparatively rare. But if several trains are to be protected; if every point in the circuit is a danger point, as Mr. Blodgett says, then whenever there is a fog or wherever a signal is on a curve or other obscure location, fast passenger trains and heavy freights without power brakes must generally reduce speed in order to approach under control. This neutralizes much of the value of the signal for in clear weather and favorable situations enginemen can get along without it. If the signal is for the protection of trains standing at the station, and not for those whose rear is 1,999 ft. back from it, conductors should be required to pull say 1,000 ft. inside the signal. They would then be protected from any train which could be stopped in 1,000 ft. But to protect trains at all points in the track-circuit section there should be a distant signal a good distance—say 1,000 ft.—back of the principal signal. This should be connected by a wire circuit, independent of the rails. The trainmen will then become habituated to seeing this signal go to danger after they have passed a good distance beyond it, and thus be unconsciously taught not to depend upon it until that distance is traversed. This auxiliary wire circuit is employed where there are two or more adjoining track circuits; why is it not equally necessary and equally practicable where there is only one section? A signal, to be of benefit to fast trains, must be a distant signal, but the term distant signal does not rightfully apply unless there is a definite distance between the signal and the danger point. In most cases of this kind a distant signal without a heme signal is better than a home without a distant, if both cannot be afforded. Of course, all the above may be answered by the claim that conductors are required to send back a flagman as though no fixed signal existed; that the flagman is the distant signal. But this sadly interferes with the theory of using machinery to provide against human fallibility.

The unique time-table which the New York, New Haven & Hartford inaugurated on its New York division last June has been slightly modified. It will be remembered that all express trains were timed to start from New York on the even hours (from 9 a. m. to 5 p. m.) and all accommodation trains to start immediately after. This gave the public an easy time-table to remember, the only material variation being in the busy hours of the evening when traffic demanded half-hourly trains (4:30, 5:30, 6:30). At four o'clock the ticket office is thronged with passengers to take four trains, all receiving their passengers at once. These were timed to leave at 4:00, 4:01, 4:02 and 4:03. But with two New York Central trains timed to start at 4:00 it was found that delays were constant, and by the new table the four trains are put down at 4:00, 4:02, 4:04, 4:06. One of the New York Central trains travels over the track reserved for way trains from Fifty-fifth street to the Harlem River (the end of the four-track line), and the other has been changed to 3:58. It is doubtful, however, if this remedy is sufficient. The four-track portion of the road is not reached until trains have hindered each other considerably in getting out of the yard. Trains timed to start three minutes past the hour have habitually occupied eight, ten and twelve minutes in traversing the first two or three blocks (less than a mile); so that the interval between the first train and the last has been five times what it was calculated to be. This scheme is a fascinating one on paper. The express train time to New Haven is just about two hours, and the way-train time three hours, so that one of the latter leaving New York behind an express completes its trip just in time to clear the next express. But as long as the third and fourth of a group of trains have to run at high speed to make up for delays in the first few miles of the trip, the passengers would doubtless prefer to take advantage of the delay and of the fast running to get an additional ten minutes for themselves before boarding the cars—even if their memories were taxed by the additional complications of the time-table. The New York Railroad Commissioners have received from a suburban passenger a complaint concerning the poor time made by these trains.

Railroad Questions in France.

The French Government finds its railroad system in bad condition. In spite of an increase of more than 30 per cent. since 1880 in the mileage operated, the gross income from the whole system remains stationary. The causes of this result are somewhat complicated. Something is due to the depression of trade which has been quite seriously felt since 1882; more, probably, is due to the failure of the companies to reduce rates. The French companies have so long enjoyed a monopoly in their several districts that there has been much less progress in railroad administration in France than anywhere else. The government has exercised a great deal of control over the roads; but this control has been in the hands of engineers as distinct from business men, and has had almost no effect in compelling railroads to reduce their rates to keep pace with the times. It is doubtful whether the reduction in French railroad charges has amounted to ten per cent. in the last twenty-five years. Further than this, the new roads have been built piecemeal, half under the control of the state, half under that of the companies. The distribution of lines in different parts of the country has been affected by political reasons rather than by commercial ones, so that the new lines have been a source of expense without as yet having developed the traffic which was expected from them.

In its dissatisfaction at these results the French House of Deputies has turned its eyes in the direction of narrow gauge railroads. A report, rendered in June last, urges strongly the abandonment of the standard gauge on most of the new lines and the adoption instead of a much narrower one. The report greatly exaggerates the saving which could be obtained in this way. It says that the lines which are to be built will cost about $100,000 a mile, but that as narrow gauge lines they could be built for $30,000, and goes on to say that had the narrow gauge system been adopted in 1879 the whole system of proposed lines could have been already built, instead of the scattered fragments which are now open for traffic.

As far as the statement with regard to saving is true, it operates as a severe indictment against the present French system of railroad construction and management. One hundred thousand dollars a mile is an enormously heavy cost for branch roads in a country whose main arteries of traffic have already been built. It shows that the engineers who have charge of the railroad do not understand the conditions with which they have to deal. To them a standard gauge line is a standard gauge line and should be built at the very greatest expense; a narrow gauge line is a narrow gauge line and may be built at much smaller cost. They do not see the real economy which is to be obtained by building a secondary class of standard gauge lines at less than their old standard of cost. It is possible that such lines might be a trifle more expensive to operate than those which they are now building, though we doubt it; but they would produce much of the economy in construction which it is sought to obtain by narrowing the gauge, while they would have the enormous advantage that traffic could pass from one line to another without trans-shipment. This part of their problem came up and was settled in the United States years ago.

If there be any truth in the idea that narrow gauge roads are relatively better for France than they have proved in other countries, it may be due to the fact that France has not reduced its charges as other countries have done. Of course, the disadvantage of a narrow gauge road is very much less where a small businsss is done at high rates than where a large business is done at low rates. Narrow gauge roads at the rates of the year 1855 might conceivably pay better than standard gauge roads at those rates, owing to the small volume of business secured. If this reasoning really applies to France it is an indictment against the commercial policy of French roads no less severe than that we have already made against the principles adopted in their construction. To build roads at $100,000 a mile is bad enough; not to reduce rates to develop traffic is still worse. The two together may make a standard gauge line as unprofitable as a narrow gauge one for ordinary traffic. But the solution of the difficulty which the French authorities seem inclined to adopt is one which we think certain to make matters worse in the long run.

Examinations of Enginemen in Alabama.

The recent decision of the United States Supreme Court affirming the validity of the law of Alabama requiring certain railroad employés to be examined for color blindness or other defect of vision, and to be approved by a board of experts before being allowed to perform the duties of their positions puts the matter of the rights of states in enforcing police regulations in the conduct of inter-state commerce on firm ground. The decision of the same court in January last upholding the law of the same state known as the engineers' license act was in precisely the same line, and the principle thus settled will serve as a guide in various cognate questions that are likely to come up in the future. It can hardly be doubted that the heating of passenger cars, involving as it does the safety of passengers' lives, would be regarded as a matter of police regulation and thus within the regulative authority of the individual states, even if it were to operate to require several kinds of apparatus on the same car. No state adjoining Alabama has passed any law on the subjects that were the occasion of these decisions, and there has therefore been no practical difficulty from conflict of authority as yet. The appeals were apparently taken for the purpose of breaking the laws simply because they were deemed unjust or burdensome, not from any fear of immediate action in contiguous states. The fee for examining engineers was fixed at

$5, and the roads not only feared, more or less remotely, that simultaneous action of, say, three different states would impose a burden of $15 per man, but, as a matter coming at once home, objected strongly to paying anything. The fee for the mechanical examination of engineers is, we believe, payable by the individual engineer, while it was prescribed that that for the visual examination should be paid by the railroad company. While a stingy or poverty-stricken company could by readjustment of wages or otherwise throw the whole expense upon the employé in either case, a liberal one could easily take the opposite position, paying for all examinations out of the company's treasury. It is, however, no more than reasonable generosity for the companies to bear the expense of testing any unreasonable law, whether its burdens rest upon employer or employé, and we understand the Louisville & Nashville now has a case before the Alabama Supreme Court, in which it resists the payment of fees.

The aggregate amount of fees on a large road is considerable, and if the law allows them to be placed at too high a figure, that law is a proper one to challenge, at least in this feature. But the general provisions of both the Alabama laws are in the right direction, and if properly administered by competent men they can work no harm to the men or their employers. The objections to such laws are based on considerations of public policy; states will appoint poor examiners, and unenterprising roads will relax their exertions on the ground that the state and not the road is responsible for maintaining a proper standard of efficiency. But a road which desires to perform first-class service can make no reasonable objection to the examination of its men for the detection of color blindness, or for evidence of skill in the performance of their duties. Roads generally are at fault for not instituting systematic examinations of their men long ago before legislators thought of it.

A Standard Freight Truck.

The subject for discussion at the monthly meeting of the New England Railroad Club possesses considerable interest, and it can hardly be denied that the running gear of freight cars is a very important factor in the economy of railroad operation. The increase in the weight and capacity of freight cars and the higher speeds rendered possible by the approaching general use of continuous brakes must be accompanied by a corresponding increase in the strength of the running parts. Car repairs are already a sufficiently heavy item in operating expenses, to show that the strength and durability of cars under existing conditions needs improvement. This need will evidently be more felt as the conditions of service become more severe. It is not, therefore, surprising that many proposals have been made to increase the strength of the various parts and improve the design, so that the durability of the truck can be materially increased without any undue increase in complexity and first cost. The adoption of a standard truck is, however, a wide question, and it seems doubtful if a majority of the great number of roads in this country would ever agree to abandon individual practice and predilections and adopt a standard truck. The adoption of the existing M. C. B. standard axle was only accomplished after much discussion, and while there is great need of another and stronger axle for 60,000-lb. cars, any agreement as to the leading proportions seems as far off as ever. The adoption of a standard truck is even more difficult, as it involves many more details and carries with it the adoption of a uniform axle, journal box and bearing, bearing spring arrangement and brake gear.

In cases where absolute unanimity seems impossible it is generally best to adopt a compromise, and possibly it would be preferable to allow a choice between three or four different trucks, if a single one cannot meet with general approval. At present the variety of trucks in use can hardly fall short of one hundred, though in many cases the differences are small. This want of interchangeability necessarily leads to great confusion and calls for some improvement. Full and free discussion cannot but help forward any reform in this direction. If the ventilation of the various views held by different speakers brings about tolerable unanimity the question will be virtually settled. If, as seems more likely in the present case, continued discussion serves but to confirm individual opinion, the need of a compromise will only be more clearly emphasized.

Fast Trains in Europe.

The history of the race to Scotland has been very fully given in these columns, and while it contains much that is interesting, the fact which most impresses an American is the number of fast trains in Europe, and especially in England, and the efficiency of the regular train service, rather than the individual record-breaking performances. The three companies connecting London with Scotland had during the summer 29 regular trains running over 40 miles an hour including stops for the distance as a whole; while there are at least a dozen others whose running speed was as great, but which fail to satisfy the standard simply because they stop oftener. The roads south of the Thames (the first four in the table) are as yet not so well provided with fast train service, but as compared with any regular trains which we can show in America most of them have the advantage. The accompanying table gives a list of fast trains running without a stop between London and points lying in various directions:

FAST RUNS FROM LONDON WITHOUT STOPPING, AUGUST, 1888.

Railroad.	Run without stopping from London—	Distance, miles.	Time h. m.	Speed, miles.	Locomotives. Leading end. Truck.	Leading end. Radial wheel.	Outside connected.	Drivers 7 ft. or over.	Compound.	Cars. Trucks.	Cars. Radial wheels.	Grades, ft. per mile.
Chatham & Dover	Canterbury	57½	1 15	46.0	Yes							53
Southeastern	Canterbury	68	1 37	42.0								
	Dover	74½	1 38	45.2						Yes*		53
	Folkstone	69	1 40	41.4								
	Hastings	60	1 30	40.0								
London & Brighton	Hastings	75	1 45	42.8								53
	Brighton	50½	1 5	46.6				Yes*				20
	Portsmouth	86	2 0	43.0								70
London & Southwestern.	Southampton	79	1 39	47.9	Yes		Yes	Yes*		Yes*		30
	Salisbury	83½	1 57	42.8								66
Great Western	Swindon	77¼	1 27	53.3								
	Oxford	63	1 18	48.4				Yes		Yes		8
London & Northwestern.	Crewe	158	3 0	52.7								
	Rugby	77¼	1 31	50.9		Yes	Yes*	Yes*	Yes*		Yes*	16
	Northampton	60¼	1 13	49.5								30
Midland	Nottingham	124	2 24	51.7								
	Leicester	99	1 55	51.7								
	Kettering	72	1 26	50.2	Yes*			Yes*		Yes		53
	Bedford	49¾	1 0	49.7								
Great Northern	Grantham	105¼	1 57	54.0								48
	Peterborough	76¼	1 25	53.8	Yes		Yes	Yes		Yes*		30
	Huntingdon	57¾	1 5	53.3								26
Great Eastern	Ipswich	68¾	1 32	44.8								
	Colchester	51¾	1 10	44.4	Yes*		Yes*	Yes	Yes*			75
	Cambridge	55½	1 15	44.4								55

NOTE.—* denotes in partial use. Blanks denote that these appliances are not in use.

The average distance is 76 miles and the average time is 1 hour 35 minutes, giving an average speed of 48 miles per hour. The slowest is London to Hastings, 60 miles, in 1 hour 30 minutes, or at the rate of 40 miles per hour, and the quickest is London to Grantham, 105¼ miles, in 1 hour 57 minutes, giving a speed of 54 miles per hour. The trains appear to differ considerably in weight, but a comparison of the figures available on this point appear to show that the average weight of engine, tender and train is about 500,000 lbs.

Many of the best of these runs are made by several trains every day, and were this taken into account, the average speed would be greater. The Great Northern, for instance, run every week day 38 trains, which run for over 50 miles without stopping, after leaving or before arriving at London. The average performance of these 38 runs (which are practically all made with engines with a single pair of 8 ft. drivers) is as follows:

Distance run without stopping. Miles.	Time. H. M.	Speed. Miles per hour.
83	1 39	50.3

The gross daily record is 3,160 miles run in 62 hours 51 minutes, which is certainly a wonderful performance especially as nearly an equal amount of fast running is done on other parts of the road. The general grades are 26 ft. per mile, but grades of 45 and 50 ft. per mile occur in the tunnels by which the line leaves London, and another grade of 30 ft. per mile is found just before reaching Grantham.

The runs given in the first table being made on nine different railroads with various types of express engines afford a means of comparing the relative performance of locomotives with different sizes of driving wheels.

Ten of these runs are usually made with engines with a single pair or driving wheels varying from 7 to 8 ft. diameter on tread. Most of the remaining runs are usually made with four coupled engines with wheels of from 6 ft. 6 in. to 7 ft. diameter. The following comparison shows the average results attained by the two types of engines:

Locomotive.	Average distance. Miles.	Average time. H. M.	Average speed. Miles per hour.
Single pair drivers.	83½	1.39	50.6
Four coupled.....	73½	1.35	46.4

The single pair of large drivers appears to give a decided advantage in speed, and the results bear out the opinion that large wheels are most favorable to the attainment of high speed on a long run. Some allowance must, however, be made for difference in grades and in the weight of trains, for doubtless, as a rule, the coupled engines are employed where the grades and trains are heaviest.

Mr. Ernest Foxwell has done much to make public accurate particulars of the running of fast trains, and Mr. Thomas C. Farrar has in preparation a work on European expresses, in which he attempts with great care to collect full statistics of such trains both in England and on the continent. But if he applied to continental Europe the English or the American standard of an express train, he would find very few which could satisfy his demands. In England nothing is called an express which does not run 40 miles an hour, including stops. On the continent the limit has to be lowered to 29 miles, in order to include the trains which are regarded as expresses; and even then the daily express mileage of continental Europe is only about 115,000. Add to this that a large part of the continental express trains do not carry third-class passengers, so that their rate of fare is really greater than in England and about as large as that in the United States; while the really fast ones often carry only first-class passengers and exact more than the regular fare, so as to make an aggregate charge of from 4 to 7 cents a mile for the whole distance. The best trains are found in Holland and the next best in France, especially on those lines which are subject to competition. Belgium stands third, Austria fourth and Germany fifth. It should be noted in addition to this, as is most clearly brought out by Mr. Farrar in his forthcoming book, that while England has been making progress in train service, Germany has been actually at a standstill, or even worse, in the frequency and speed of trains on the important traffic roads.

We conclude our article by giving the speeds of the three fastest trains in France and the fastest train in Austria. The first and last trains in the table have to contend with some heavy grades. The first two trains are run by the International Sleeping Car Company on three or four days a week only. Extra fares are charged, and the trains correspond to our limiteds. The train to Bordeaux is faster than anything in this country for so long a distance, and is the fastest train on the Continent of Europe.

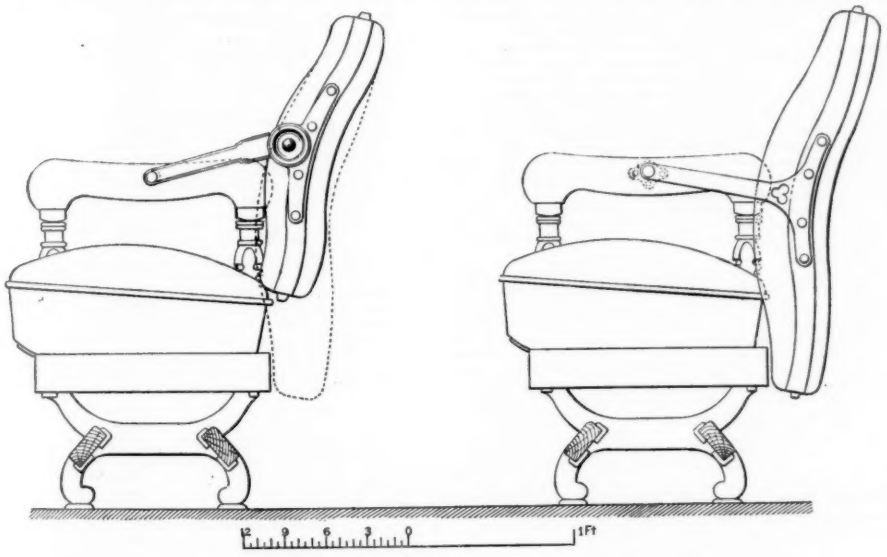
	Distance. Miles.	Speed. Miles per hour. Including stops.	Speed. Miles per hour. While in motion.	Av. dist. between stops. Miles.
Paris—Marseilles	536	37.0	38.3	76.5
" —Bordeaux.	363¼	42.5	44.1	61.0
" —Calais	184½	40.7	43.0	61.5
Berlin—Vienna ..	476	34.0	38.1	28.0

The last route is over four different railroads, two German and two Austrian, but the greater portion of the trip is made in Austrian territory, where the highest speed is attained. On the Austrian State Railroad a distance of 169 miles is run in 4 hours 35 minutes, with five intermediate stops, which is a very creditable performance, being nearly 37 miles per hour, including stops.

The examination of train and station men for the purpose of proving their qualifications is often of peculiar benefit to the candidate personally, as well as to the company. There is, indeed, no doubt that in a broad sense any man who is justly rejected because of unfitness for a certain position is really the gainer in every case, for he is definitely turned out of a wrong course, and thereby incited to seek a suitable one. The following incident may appear like an extreme case, but if examinations were more common similar conditions might be found more frequently than is now realized. It was narrated to a friend by the late Colonel B——, once in charge of an important railroad in New Jersey. Railroads had not then made such extensive examinations as have been undertaken by large roads within the last year, but the methods employed were perhaps in many respects in advance of those recently employed. The Colonel had placed the matter in the hands of a special examiner, and in addition to the regular grading of employés, required all applicants to submit to a rigid measuring of their mental, moral and physical qualities. One day the examiner reported that he found on the rolls as freight brakeman a man, Samuel ——, who was already indexed as examined, and

whose record showed that he had been rejected as an applicant, the previous examiner noting him as standard in all points, except "that he seems dull, not able to think promptly, not likely to decide quickly what to do in an emergency." In the meantime he had been picked up as an extra and was now in regular service. "Well, examine him," said the Colonel, "maybe he has got over that." The result of the second test was the same. "A good, sound, honest man, but evidently not quick to think; would not regard him safe in time of danger." Further inquiry, however, showed that the man had a large family, and so, out of the goodness of his heart, the superintendent instructed the trainmaster that while he must not retain the man in service permanently, he might let him work the month out as a matter of charity. A few days later an investigation of a derailment showed that it had been caused by the hurried throwing of a switch in the wrong direction, and Samuel —— was the man at the switch. 'Oh, it's only a week more let him have his full month,' said the superintendent, "but be sure to drop him then." Two weeks later, on returning from a vacation, the first news received by the superintendent was that Samuel —— was dead. The unfortunate man on the top of a freight train had felt the warning stroke of the "bull-tails," the notice that the train was approaching an overhead bridge, but not being quick to decide the right thing to do, had stood up and met an instant death. "When I heard that," said the Colonel, "and thought of that wife and children, I made a solemn vow that I would rigidly enforce the system of examinations, and stand by the records thereafter as a life saving and charitable service to the men, as well as for its advantages to the company;" and he always did.

It is somewhat singular that the numerous improved car-seats introduced within the last few years are often so conspicuous by their absence in cars otherwise of the latest and most improved construction. No one item in the fittings of a car contributes so much to comfort as a well-designed seat, but in many recent cars the seat is the only appliance which appears to have undergone no improvement. One of the most conspicuous defects of the usual style of seat is the long back, which interferes materially with the comfort of the person sitting behind it. The lower part of the long back cramps the legs and limits any change of position. As short backs involve some economy of material otherwise wasted, and present no inherent difficulties of manufacture and have little or no additional complexity, it is difficult to understand why their adoption is still so far from general. The accompanying diagram shows one form of short back and illustrates clearly the fact that the useful office of the seatback, the support of the shoulders, is not interfered with, while the lower part which simply prevents any freedom of motion to the legs of the passenger on the next seat, is, at the same time, materially shortened. The passenger thus gains in comfort, while some economy is effected in the amount of material required to cover the seat.



In the accompanying diagram the seats are shown pitched at the usual distance, 36 in. The dotted line on the front seat shows the old form of long back, while the solid line on the same seat shows the new form of short back. The gain in space for the knees is clearly shown in the drawings and is vividly felt on a long ride. The rear seat is shown with the long back. It will be seen that the height of the backs is alike and that both give an equally good support to the shoulders.

The reduction of wages on the Atchison, Topeka & Santa Fe, which has been reported in the newspapers in various shapes, seems to have been a cut of 10 per cent. in the pay of all salaried employés who receive over $50 per month. President Strong reduced his own salary 25 per cent. It is stated that the engineers, firemen, brakemen, conductors and other trainmen paid by the day or trip are not affected. A Topeka paper gives an account of a large meeting of employés held in the court house in that city, which passed resolutions recognizing the necessity of reducing the pay, and the liberal policy of the company in the past, and pledging acquiescence in the present move and devotion to the company in future. The resolutions were adopted unanimously, but a curious statement of the report is that "no one seems to know who called the meeting." The resolutions had a cut-and-dried air about them, but, nevertheless, elicited no serious opposition. The *Railway Service Gazette*, on the occasion some time ago of a reduction which, like this, affected certain classes of employés who were not organized in any shape, while it did not affect certain other classes who had been known as somewhat agressive in advocating their wishes through brotherhoods or other organizations, remarked that the action of the railroad companies in thus clearly recognizing the power of an organization of employés (such as the Brotherhood of Locomotive Engineers, for instance) afforded "tons of argument" in support of the rightfulness and value of such associations. There is certainly sense in this view, and if a railroad company reduces the wages of clerks or station agents while not reducing those of engineers or conductors, it is bound in fairness to show that the wages of the men who were cut have been heretofore too high as compared with those of the other class. Any other attitude tends strongly to show that the company is influenced by the existence of organizations amongst its employés when it is compelled to be, but not otherwise. The cost of living and the supply of labor, as compared with the demand for it, are the two principal factors in the establishment of a wages rate, but it is not to be supposed that either of these has greatly changed with one class of employés and not with others.

A bill has been introduced into the Georgia state legislature to offer for sale the Western & Atlantic Railroad for a minimum price of about $8,752,000, or the amount of the present state debt. The lease of this road expires October, 1890. The lessees pay $300,000 a year. The road is 138 miles long, from Atlanta to Chattanooga, and although it is apparently well equipped, at least as to amount of rolling stock, $63,400 per mile seems an unreasonable price to expect for it. This is evidently recognized by the author of the bill, for he says "state ownership is not elastic enough to preserve the value of the road. In the present combinations of railroads its value is seriously threatened, and it may be that in a few years it would be dead property on the hands of the state. The new deal, as it is called, of the Richmond Terminal bottles it up at both ends. The Marietta & North Georgia threatens to cut off the 20 miles between Atlanta and Marietta, and thus make it only a local road from Chattanooga to Marietta. This would impair its value at least 25 per cent., and my opinion is firm in the conviction that the sooner we dispose of it the better." It is proposed that $2,090,000 of the purchase price shall be paid by October, 1890, and the balance in annual installments up to 1915. The author of the bill is quite confident that it will pass.

The praiseworthy work of elevating the passenger tracks of the Pennsylvania in Jersey City is finally begun. It is but just to say that it is not the company's fault that it was not begun long ago. It will be remembered that the city council long successfully resisted this great improvement, and for no good reason. When at least these official obstructions were removed the company was not in condition to undertake the work. This is one of those cases in which the interests of humanity and of economy are identical. It is said that nearly 300 persons are killed or injured annually on the Jersey City crossings. As all of these crossings have gates and flagmen we suspect that this figure is too great, but certainly a good many deaths do occur there. The cost of maintaining and protecting the crossings and of paying for the killed and injured at them will doubtless amount to a good interest on the cost of the viaduct.

The Denver Demurrage Bureau, which was started at about the same time with that at Omaha, but which, it will be remembered, was soon discontinued by reason of differences between the roads, has been rehabilitated, a circular just issued announcing that from Nov. 10 demurrage will be charged on all loaded cars held in any of the yards at Denver, West Denver, Burnham, Jersey and Argo more than 48 hours. The rates given are: For the first five days, for each car, 50 cents per day or fraction thereof; for the second five days, for each car, $1 per day or fraction thereof, and for each ensuing day or fraction thereof, for each car, $2, until such car is unloaded. The name of E. E. Hill, the successful superintendent of the Omaha bureau, is appended to this circular, which apparently indicates that his methods are worth transplanting.

NEW PUBLICATIONS.

Die Eisenbahnen Oesterreich-Ungarns, 1822-1867. By P. F. Kupka. Leipzig: Duncker & Humblot. 1888.

The author's name will be familiar to some of our readers from what he has written about American railroads. His present book is much the best which he has published. Writing of Austrian history, he was able to consult his authorities at first hand, and the result seems highly satisfactory.

Austrian railroad history presents several features of special interest. Though the fact is not generally known Austria was the first continental country to make use of railroads. It did so earlier than Belgium and much earlier than France and Germany. In fact, it may fairly claim to stand on an equality with the United States in this respect, and to stand second only to England. The first Austrian railroad charter dates from 1823. In 1832 the line from Budweis to Linz, 80 miles in length, was open for traffic, though for the time being operated only by horse-power. The credit for this result belongs chiefly to Professor von Gerstner, who was as thorough a believer in the project as George Stephenson himself.

Austria had this point of resemblance with the United States, the country extended over such a wide area and included such different industrial interests, that railroads were welcome as a means of binding different sections together. But the Austrian Government, unlike that of the United States, found it necessary to build railroads itself, because private enterprise was not always sufficient for the purpose. About 1850, the government began to part with the roads which it owned, selling most of them at much less than their true value. From that time until the close of the period treated by our author, the Austrian roads were nearly all in private hands. The detailed history of the various companies is given in compact and well arranged form. The book closes abruptly with the year 1867, and says nothing of the reaction in favor of state ownership which has marked the policy of Austria in the most recent period.

The Railways Terminating in London, with a Description of the Terminal Stations and the Underground Railways. By Samuel Rea, M. Am. Soc. C. E. Published by the Engineering News Publishing Co., New York.

This account of the construction and working of the most costly and elaborate system of terminals in the world gives a great many facts and figures, and the subject is elucidated with maps. The book might, however, have been profitably extended, especially with regard to freight stations and the latest developments of railroads in London, which presumably embody the results of past experience and promise to be cheaper and more convenient than the existing lines. Mr. Greathead's method of making deep tunnels presents several novel points, and the line along the banks of the Regents Canal is also somewhat of a new departure.

The Steam Boiler Catechism. By Robt. Grimshaw. Published by the Practical Publishing Co., 21 Park Row, New York.

The form of this volume is somewhat inconvenient, but it contains numerous illustrations and much information that will be useful to those in charge of steam boilers.

Preparing for Indication. Practical hints by Robt. Grimshaw. Published by the Practical Publishing Co., 21 Park Row, New York.

The methods of indicating the power of engines under various conditions are clearly described, and are elucidated by many diagrams, which will render the book useful to those who are for the first time called upon to take indicator diagrams.

TECHNICAL.

Locomotive Building.

The Woodward Iron & Furnace Co., of Alabama, received, a few days ago, three new locomotives to be used on their branch lines. The engines came from the Baldwin Locomotive Works, at Philadelphia. The Cahaba Coal Mining Co. has also received a new consolidation freight locomotive from the Rogers Locomotive Works, at Paterson, N. J.; two others are expected to arrive shortly. The Rhode Island Locomotive Works, of Providence, has also delivered two locomotives to the DeBardeleben Coal & Iron Co., of Birmingham.

The Louisville, New Albany & Chicago has in the last few months received nine heavy freight locomotives. Four were built at the Rogers Locomotive Works and five at the Rhode Island Locomotive Works.

The Chesapeake & Ohio has ordered recently four locomotives from the Schenectady Locomotive Works, ten from the Cooke Locomotive Works, and will place orders shortly for ten more.

Car Notes.

The Kansas City, Fort Scott & Gulf is asking bids for 300 box cars.

The Ohio Falls Car Co., of Jeffersonville, Ind., this week delivered 13 new caboose and 10 passenger cars to the Georgia Southern & Florida.

McKee, Fuller & Co. are building an extensive erecting shop to their works at Fullerton, Pa., 132 by 50 ft. in dimensions.

The Iron Car Co., of New York, has its tubular iron car now in service on the Philadelphia & Reading, Western New York & Pennsylvania, Sinnemahoning Valley, Central of Georgia, Norfolk Southern and the Mobile & Ohio roads,

making a total of nearly 3,000 cars now in actual service. The Old Colony is asking bids for 30 passenger cars.

The Terre Haute car-works are building a number of the Street patent stock-cars, and are still at work on the 100 coal cars, 60,000 lbs. capacity, for the Cincinnati, Sandusky & Cleveland.

The Ohio Falls Car Co. has completed the order for the South Carolina road, for six passenger coaches and 200 box cars, and is now building 100 platform cars for another Southern road.

The Barney & Smith Mfg. Co., of Dayton, O., has been awarded a contract to build 500 box cars and 500 coal cars for the Chesapeake & Ohio road.

Bridge Notes.

The Mexican Central will soon commence the erection of a 285-ft. span iron bridge over the Chubiscar River, in the state of Chihuahua. The company will also build a through truss iron bridge over the Lerma, at La Barca, on the Guadalajara division. The bridge will have a span of 200 ft. and two iron girder approaches, each of 50 ft.

The Denver City Cable Railway Co. will soon receive bids for an iron viaduct on Sixteenth street drive. Robert Gilham, Clayton Block, Denver, is Chief Engineer.

The Milwaukee Bridge & Iron Works have received the contract to build a $125,000 bridge across the Saginaw River at Bay City, Mich. The bridge will have four spans of 150 ft. each, and a draw of 240 ft.

The Edge Moor Bridge Works, of Wilmington, Del., has been organized to succeed to the business heretofore conducted by the Edge Moor Iron Co., of manufacturing and erecting iron and steel bridges, roofs, viaducts, turntables and general structural work. The officers are: Henry G. Morse, President; William Sellers, Vice-President; W. F. Sellers, Secretary; W. H. Connell, Treasurer; F. W. Heiler, Purchasing Agent. The Edge Moor Iron Co. will continue to transact all the other branches heretofore conducted by it, excepting those above mentioned.

The Vermont Construction Co., of St. Albans, Vt., has the contract for building an iron truss bridge over the North Channel, near Skowhegan, Me. A draw-bridge is to be built across Niagara River from Grand Island, N. Y., to the main land.

The Toledo, Ann Arbor & North Michigan has asked for proposals for constructing a bridge, with a trestle 1,500 ft. long, across the Manistee River, near Sherman, Mich.

The Nebraska & Dakota Bridge Co., in which F. M. Dorsey, of Sioux City, Ia., is interested, will build a large bridge across the Missouri River, at Ponca, a few miles from Sioux City.

A new iron bridge is to be built at Canaan, N. H.

The new McKeesport & Bessemer Railroad proposes to bridge the Monongahela River twice: once at Port Perry and at Riverton, Pa., and the Youghiogheny River at McKeesport. The three bridges, it is estimated, will cost nearly a million dollars.

The following bids for constructing an iron bridge near Jersey City, were received by the Bridge Committee: Rose & Sandford, Jersey City, N. J., $95,460; Smith Bridge Co., Toledo, O., $81,500; Dean & Westbrook, New York, $110,000; The Riverside Bridge & Iron Works, Paterson, N. J., $74,869; The King Iron Bridge Manufacturing Co., $93,000; Wallis Iron Works, Jersey City, $93,405; Penn Bridge Co., Beaver Falls, $99,780, and B. M. & J. F. Shanley, Newark, N. J., $83,950. The lowest bid was accepted.

The Central Vermont has just completed at Ticonderoga, N. Y., on the Addison branch, a new 300 ft. draw-bridge.

The Louisville, New Albany & Chicago has contracted for new combination iron and steel bridges to cross the White River at Gosport and at Bedford, Ind.

The Phœnix Bridge Co., of Philadelphia, Pa., has been awarded the contract to build an iron bridge for the Kentucky Central road across Licking River.

Two piers of the Oregon Railway & Navigation Co.'s bridge over the Snake River at Riparia have been completed, and the caisson for the third one is being put down. Three of the five piers of the bridge will be sunk on pneumatic foundations.

Manufacturing and Business.

The Dayton Manufacturing Co. has just cast a life-size bronze figure of a sailor, and has in hand one of a soldier, both for a soldiers' and sailors' monument to be erected at Seneca Falls, N. Y. The work of this company in smaller castings of bronze and brass for car trimmings, etc., has long been known for fine design and good workmanship, but this, we believe, is its first attempt at large statuary work. Judging from the photographs and descriptions received, the result is very successful.

Some time since the Crosby Steam Gage & Valve Co. built a new factory at Charlestown, by which facilities for manufacturing its specialties were greatly increased. The company has now enlarged its salesroom and office at 93 Oliver street, Boston, and will carry a full stock of its own products, and also complete lines of engine and boiler supplies. The sales from its London store are very gratifying. Mr. Geo. A. Mower, the London manager for the company, is now in Boston perfecting plans for a larger output of indicators and other instruments made by this company, and especially adapted to the requirements of European engineers and machinists. The Crosby indicator is in use in the principal European navies.

Van Auken & Mead, 100 Opera House, Denver, Colo., would like to receive descriptions of all motors for use on suburban roads.

The Marion Steam Shovel Co., of Marion, O., has sold this year 27 steam shovels, 16 dredges and over 100 ballast unloaders. The company is now at work on some heavy dredges for the Pacific coast, and has nearly completed two shovels for Cleveland contractors.

The Westinghouse Electric Co., of Pittsburgh, Pa., has been awarded the contract for a central station plant in London, England. The contract calls for 25,000 16 c. p. incandescent lamps. The company has purchased almost the entire capital stock of the Waterhouse Electric & Mfg. Co., of Hartford, Conn., thus obtaining a large interest in the arc light business, as the Hartford company has now over 3,000 lights in use. The Westinghouse Co. has had an agreement with the Thomson-Houston Co. regarding the use of the arc lamps, but this was lately dissolved.

Proposals will be received by the Navy Department until Dec. 27, for furnishing machines and tools required by the Bureau of Construction and Repair, for the Navy Yard at Mare Island, Cal. Blank forms on which proposals must be made and other information can be obtained on application to the Chief of the Bureau of Construction and Repair, Navy Department. Proposals must be made in duplicate and addressed to the Secretary of the Navy, Washington, D. C. All proposals must be accompanied by either plans or descriptive cuts of all the machines and tools which the bidder offers to furnish.

Lodge, Davis & Co., of Cincinnati, report the following orders for tools, of the Long & Allstatter Co., Hamilton, O.; the Missouri Pacific, St. Louis, Mo.; East End Gas Works, Cincinnati, O.; Hoffman Machine Co., Detroit, Mich.; the Eagle Iron Works, of Detroit, and several others. They have sold about 35 duplicates of machine tools, on exhibition in the Cincinnati Centennial Exposition, and have a large number of orders on their books yet unfulfilled.

The Gilbert & Barker Mfg. Co., of New York City, has recently purchased the supply business of the American Mfg. & Supply Co. Mr. W. E. Ogilvie, Secretary and Treasurer of the American Co., will continue in charge of the supply department at 12 Dey street.

The American Railway Equipment Co., of New York, has recently taken the agency of the Crosby Steam Gauge & Valve Co., and will move their offices from 45 Broadway to 66 John street.

The following companies have recently been incorporated in Illinois. The Shaw Electric Crossing & Advance Signal Co., of East St. Louis, with a capital stock of $1,000,000, with W. P. Shaw, A. X. Mackay and John B. Lovingston as incorporators; also the Locomotive Buffer Co., of East St. Louis, capital stock $100,000, incorporators, Albert Blair, E. B. Leigh and George F. Baker.

The Northern Construction Co., of Chicago, has been incorporated with a capital stock of $1,000,000, to build canals, bridges, docks, railroads, and other internal improvements; the incorporators are Edgar B. Tolman, Charles A. Grant, and A. L. Howard.

Iron and Steel.

The Light Rolling Mill Co., of Lebanon, Pa., has purchased the plant of the Port Carbon Iron Co., consisting of eight puddling furnaces and two sets of rolls. The machinery will be shipped at once from Port Carbon to Lebanon.

The new works of the Henderson Steel &Manufacturing Co., at Birmingham, Ala., have started up and are now prepared to do business and make steel on an enlarged scale. The plant's capacity is enlarged from 4 to 16 tons, and calcine magnesia is used for lining.

Northampton Furnace, near Freemansburg, Pa., operated by the Bethlehem Iron Co., of Bethlehem, Pa., has blown out, and will remain idle until spring. In the meantime the furnace will be thoroughly overhauled and improved.

The Mitis Wrought Iron Casting Co., of Nefonset, Pa., has been obliged to double the capacity of its works within the past six weeks, and now has six crucible furnaces. The fuel used is crude petroleum, which is led by pipes to the front of the furnaces and dropped on to the grate bars.

The Newport Aluminum & Steel Co. will erect an aluminum open hearth cast-steel plant at the Newport Iron & Steel Works, Ky., which will have a capacity of 20 tons per day. The process, tested there, dispenses with the puddling furnace entirely, and the cast-steel is guaranteed to stand a tensile strength from 65,000 to 80,000 lbs. per square inch, with 45 per cent. reduction of area. The plant is to be ready for operation on or before Jan. 15 next.

McClure & Schuler have contracted for a new blast furnace for the Carrie Furnace Co., at Keating Station, Pa., on the Baltimore & Ohio. It will be 80 ft. high, with four stoves, 19 ft. 6 in. diameter, by 70 ft. high. They have also complete dnegotiations with the Thomas Furnace Co., Niles, Ohio, for a plant of stoves, 16 ft. 6 in. diameter, 62 ft. high.

About 700 men will be employed in the converting and blooming departments of the new Bessemer steel works now being built at Duquesne, Pa., by the Allegheny Bessemer Steel Co. The converting mill cost $300,000, while the rail and blooming plants cost $600,000, making the entire cost of the works $900,000. The company at the commencement will have to purchase from outsiders all the pig metal used, but it is the intention to erect two blast-furnaces close to the rail mill. It requires the product of two furnaces to keep the mills supplied. The work on this improvement will likely be commenced in the early spring.

The Montgomery Furnace and Chemical Co., of Montgomery, Ala., will shortly reorganize and complete its charcoal iron furnace and chemical plant.

The Lohr Iron and Steel Works, of Pittsburg, Pa., is enlarging its blast-furnace to a capacity of about 200 tons per day. It will go into blast about the middle of February.

A new process in the manufacture of crucible cast steel, known as the Kingsland-Sinclair process, has recently been invented by Le Roy Kingsland, of Pittsburgh. An experimental lot of steel was recently made by this process at the steel plant of Howe, Brown & Co., Limited, in that city, which has been tested in the Pennsylvania shops at Altoona, Pa., and also by Miller, Metcalf & Parkin, at Pittsburgh, giving satisfaction. The point claimed by the inventor for his process is that a crucible steel equal to the celebrated brands of Mushet steel can be produced for about one-fifth the cost of the above-named brand.

It is reported that the Pittsburgh & Lake Erie Railroad is endeavoring to purchase the Clinton Rolling Mill, at Pittsburgh, Pa., formerly operated by Graff, Bennett & Co.

The Union Malleable Iron Co., Moline, Ill., has started its shops again after a year's inactivity. The capacity of the works is 15,000 tons.

The Rail Market.

Steel Rails.—The orders placed with the two Eastern mills which have taken the majority of contracts now amount to 47,000 tons, of which 27,000 tons are for Southern delivery; the balance is for one of the trunk lines. The Pennsylvania is negotiating for about 40,000 tons, and when this is placed the principal trunk lines will be supplied, and nearly all the large New England lines have also purchased their 1889 requirements. The market is unsettled, and it is reported that orders have been placed at $27, but the prevailing quotations are $27@$28 at Eastern mills. Chicago mills have taken orders for less than 10,000 tons this week, and $30 is quoted.

Old Rails.—A sale of a 2,000-ton lot, for a Western mill, to be delivered on the Hudson River, has been made at private terms. Another sale of 500 tons at $22.50, delivered at Jersey City, is reported. Small lots are occasionally disposed of at this price, but $23 is the general quotation.

Automatic Equalizer for Street Cars.

The J. G. Brill Co., car builders of Philadelphia, has devised an automatic equalizer for distributing the weight of loads upon the short wheel base of street cars and preventing the pitching, which is disagreeable at all times, and in the case of an electrically driven car seriously interferes with the application of power.

Driver Brakes on the Wabash.

Several freight locomotives on the Wabash are being fitted with an air-brake recently invented by Master Mechanic Morris.

A Second-hand Equipment Depot.

Mr. Albert H. King, of 11 Wall street, New York, announces that he has leased the grounds and shops of the Pennsylvania Railroad Co., located at Bordentown, N. J., for purposes of storage and repairs. The buildings have been remodeled as a railroad equipment depot, where a stock of second-hand locomotives and cars in serviceable condition can be found.

The Nicaragua Canal.

The act incorporating the Nicaragua Canal Company passed the Vermont Legislature Nov. 13.

The Canadian Canal at the Soo.

The contract for the construction of the Sault Ste. Marie Canal has been awarded to Hugh & John Ryan, of Toronto and Brockville. Associated with them is M. J. Haney & Co., of Watertown, N. Y. The amount of the contract is $1,200,000.

Car Heating.

A notice has been issued by the New York Central that no arrangements should hereafter be made for hauling passenger cars in the trains of that company unless they are fitted to use steam heat and to couple with the Martin system.

Seven coaches were burned on the Richmond & Danville Nov. 12 in consequence of a derailment. No details of the accident or cause of the fire are yet received.

A Pullman car on the Pennsylvania took fire while the train was in motion, and much clothing was destroyed, as well as more or less of the furniture of the car. No personal injury was done. The origin of this fire, also, is unknown.

Bids for Ordinance.

The Chief of Ordinance has issued advertisements inviting bids for steel forgings for guns. These call for forgings for guns and mortars and for special parts of them to the value of something like $1,500,000. The bidders are required to state the average per pound for forgings of each calibre, must state when deliveries can be made and must guarantee to have or propose to erect a suitable plant, including best modern appliances, capable of making all the steel required and of finishing it in accordance with the contract. The number of sets of the steel gun forgings must not be less than 21 for 8 in. calibre, 22 for 10 in. and 14 for 12 in., any increase proposed by bidders in the number of sets to be furnished will be evenly distributed. Bids for the gun forgings are to be opened Dec. 20, for the manufacture of mortars, for steel forgings, for hoops, etc., of mortars and for cast iron bodies of 12 in. mortars on Dec. 15, and for the 3 2-10 and forgings and single 12 in. forging on Dec. 11.

Sale of the Waterhouse System to the Westinghouse Company.

The acquisition by Mr. George Westinghouse, Jr., of the entire capital stock of the Waterhouse Electric & Manufacturing Co. has already been announced. The machinery for the manufacture of the arc apparatus of this company is being erected in the works of the Westinghouse Electric Co. The contract of the Westinghouse Co. with the Thomson-Houston will terminate Nov. 30, and the Westinghouse Co. is determined to exploit the arc lighting business to the greatest possible extent; and to that end has not only secured the Waterhouse inventions but other valuable inventions relating to the automatic regulation of the current for arc lighting purposes. The Waterhouse Co. has about 5,000 arc lights in operation in a number of small stations.

It is said further, concerning the business of the Westinghouse Electric Co., that the experiments conducted during the last three months with the Tesla motors have been of a most satisfactory character. A form has been perfected that will operate on the existing alternating circuits for running fans and other light machinery, and the large motors for street car purposes and power purposes generally have been brought to a high degree of perfection and efficiency.

Brooklyn Bridge Railroad.

At the 1 st monthly meeting the treasurer reported total traffic receipts for the month of October as $86,312, an increase of $9,480 over September and of $6,126 over October, 1887. The expenditures for the month were $57,687. The total passengers carried were 3,116,198 for the month, or 100,522 per day. The passengers by the railroad increased 8,514 over last month.

Superintendent Martin reported that the new cable plant is working successfully, and the trustees ratified his action in advertising the old plant for sale. At the superintendent's request the president was authorized to buy six new cars at a cost not exceeding $4,000 each.

The Pacific Cable.

The Premier of Victoria is taking energetic action to promote a Pacific cable. He has addressed a circular letter to the different Colonial governments, urging that Australasian interests demand a service which is not likely to be subject to stoppages by the action of extraordinary physical forces. The measures taken by the Lords of the Admiralty for the survey of the route are, in his opinion, entirely inadequate, and he proposes that the colonies should join in an appeal to their lordships to set apart two additional vessels for the work.

Riehle Testing Machines.

A Riehle screw power testing machine, of 100,000 tons capacity, has been erected at the Boston navy yard. The machine was examined and reported upon by a special board of engineers of the United States navy. In this report the board says:

"In regard to the facility of obtaining the elastic limit, throwing off the load in order to measure permanent set; the ease of following up the load to determine ultimate strength, when desired to test specimen quickly, the sliding poise, moved by the hand-wheel and cord on the weighing beam in this machine, is specially adapted for this purpose, as the operator can follow up the load with ease and facility, and when that limit is obtained it is instantly shown by the end of the beam dropping on the rest, and the reading can be taken by the operator at his leisure. Throwing off the load is accomplished by reversing the motion and moving the sliding poise back to the starting point. In five trials of this kind, made for the Board, the mean time was eleven seconds from the time the signal was given till the beam dropped. In regard to the ease of following up the load for ultimate strength, the sliding poise appears to be an excellent device for this object in every respect. The many features in the wearing parts of the machine to insure firmness and durability receive the highest commendation of the Board."

Another testing machine will be shipped shortly to the Thompson Electric Welding Co., of Lynn, Mass.; one to the shipbuilding firm of Hereshoff & Co., Bristol, R. I, and one to the Dennis Long Co., of Louisville, Ky.

The Troubles in Manitoba.

The Canadian Pacific has for the time triumphed in the railroad-crossing matter. The local government gave orders Nov. 13 for an immediate suspension of work for the winter on the Portage extension of the Northern Pacific & Manitoba, owing to the inclemency of the weather.

RAILROAD LAW—NOTES OF DECISIONS.

Powers, Liabilities and Regulation of Railroads.

In New Jersey the Court of Errors and Appeals holds that if a railroad uses a portion of its roadway over which it has only a right of passage for distributing cars and making up trains, and keeps locomotives and cars laden with livestock standing there, so that the stenches, noises, smoke, etc., thereby occasioned destroy or substantially impair the legitimate use of private property, such use amounts to a nuisance and the person injured becomes entitled to redress. Where the railroad company claims the right to use its tracks in the manner complained of by reason of necessity, and adverse use for more than twenty years, if it appears that

certain of its tracks had been used for more than twenty years, but that the tracks, the use of which constituted the nuisance, had been laid a much shorter time than that, the alleged right does not exist.[1]

In Missouri the town of Kahoka was incorporated in November, 1869. The charter was forfeited for non-user, October, 1886, the creditors of the town not being made parties to the proceedings. In the meantime the town had exercised corporate functions, electing trustees, levying and collecting taxes for municipal purposes, bringing and defending suits and issuing railroad aid bonds. In November, 1886, the city of Kahoka was incorporated, embracing substantially the same population and territory as the old town of Kahoka. The United States Circuit Court holds that the city is liable on the bonds.[2]

In Kansas, the Supreme Court decides that where the general manager of a railroad company retains a practicing attorney to attend to the legal business for the company, the company is liable for the services of the attorney, unless the general manager had no authority to make the employment, and the attorney knew, or might have known, by using ordinary diligence, that he had no such authority.[3]

In Alabama, it is held by the Supreme Court that a conductor of a freight train has implied authority, in case of the sickness of one of his brakemen, to employ a person to take his place.[4]

In New York the United States Circuit Court decides that where provision is made for retiring a series of secured income bonds of a railroad, and issuing new bonds in exchange, the bonds surrendered to be held by a trust company uncanceled until all are retired, a bondholder who does not consent to surrender his bonds is notentitled, in an accounting under the mortgage, to claim for interest due him more of the income than his share would have been had no bonds been surrendered. In an accounting in favor of income bondholders of a railroad, if the company has seen fit to pay a higher rate of interest than needful upon prior incumbrances, it cannot charge the difference against the income to the injury of the bondholders in direct contravention of the provisions of the mortgage securing the income bonds. In this case an allowance made by the mortgagor to a connecting road for a diversion of earnings should be rejected from the expense account in ascertaining income applicable to the payment of interest.[5]

In Minnesota the Supreme Court rules that logs cut by the railroad on land exempt from taxation are subject to taxation.[6]

In Pennsylvania the Federal Court holds that the first claim of letters patent No. 99,723, which is as follows: "The herein described method of supplying locomotive tenders with fuel or water, which method consists in using the traction of the moving locomotive, acting through chains, or any proper connection, to raise the buckets, boxes or other delivering apparatus, so that their contents may be discharged into the tender as substantially set forth," must be construed as a claim for the particular means devised and shown to perform the work therein specified, and not as a broad claim for a method of accomplishing the result, and that the patent is therefore valid and is infringed by an apparatus made in accordance with the specifications contained in letters patent No. 245,350, granted to John B. Collin, Aug. 9, 1881, and reissued letters patent of Dec. 4, 1883, No. 10,417, for supplying locomotives with coal, consisting essentially in the employment of the movement of the engine in connection with the hoisting mechanism for elevating the coal into the proper position to be discharged into the tender.[7]

In Massachusetts the United States Circuit Court decides that the first claim of letters patent No. 326,401, of Sept. 15, 1885, to Frederick A. Casey for a car coupling—"a draw-head having the hook pivoted to the plates below the line of draw, and keyed to said plates above said pivot, whereby, as the key is removed from contact with the hook, the hook swings down out of contact with the hook of the adjoining car," etc.—is infringed by letters patent No. 327,066, of Sept. 29, 1885, to Finley R. Butterfield, the device embodied therein having a draw-head with a hook pivoted below the line of draw, and hooked or latched to the plates above the pivot, and the latch or hook being the equivalent of the Casey key; and that the Casey patent is not anticipated by the Snedaker and Thurber patents, those patents having a pivoted device where the link is pivoted below the line of draw, and such devices relating to linked couplings, which are substantially different in construction and mode of operation from the coupling hooks of the Casey device.[8]

Carriage of Goods and Injuries to Property.

The Federal Circuit Court in Colorado rules that neither the common nor the statute law of that state requires that a railroad company shall fence its track to prevent cattle from straying upon it. Hence, the company is not liable for the death of one of its engineers caused by a collision with cattle on the track.[9]

In Iowa the Supreme Court decides that water which in flood-time leaves the channel of a creek above a railroad embankment, overflows adjoining land, and is forced back into the channel by the embankment, is not surface water so as to relieve the railway company from liability for damages caused by its obstruction at an inadequate culvert. The right to damages for an obstruction of a stream by an insufficient culvert does not accrue when the culvert is built, but when the overflow actually results.[10]

In Michigan the Supreme Court holds that where stock has entered upon the premises of the railroad company, and been killed, the question is not whether all the grounds, along some point of which the stock entered and which are alleged to have been set apart for depot purposes, have been actually used as such, but whether, in view of the present or prospective needs of the company, such grounds are not unreasonably extensive. This fact being determined, the liability of the company is a question of law, and not in the province of the jury.[11]

In the same state the Supreme Court rules that in an action against a railroad company for injuries to plaintiff's cow, where the evidence shows that at the village of A., through which defendant's road passes, said road is unfenced for two-thirds of a mile, and is without any cattle-guards the whole distance; that plaintiff's cow got upon defendant's right of way at a point within the unfenced portion, and was struck by defendant's cars and killed; and that the station and highway crossing are so situated that the railroad could be fenced on both sides as required by statute, without inconvenience to the public or to the company, a judgment for plaintiff will be sustained.[12]

In Missouri the United States Circuit Court holds that it will not entertain a bill of an abutting proprietor to enjoin a railroad company from operating its trains over a track laid in a public street under legislative authority on the ground that he has not been compensated for the incidental damages, where complainant's property has not been actually taken, and he has made no effort to arrest the work, nor given notice that he claims damages, until after the track has been laid, though the constitution of the state requires compensation in advance for the taking or damaging of property for public use. In such case he must be left to his remedy at law.[13]

In New Jersey the Court of Error and Appeals hold that when a landowner files a map of his land showing an avenue along the proposed route of a railroad in process of construction, in the centre of which avenue is plotted a double-tracked railroad, with an open roadway on each side of it, and the railroad tracks are subsequently laid along the space indicated for them on the map, a deed for the occupied land being afterwards given by the owner to the company which is authorized to acquire lands in fee simple, the roadways on each side of the railroad tracks embrace all the land that is dedicated to public use. If in such case the owner conveys lots bounded by the avenue the purchaser will only take title to the centre of the roadway situated between his lots and the railroad tracks, and he cannot maintain ejectment in case the railroad company encroaches on the half of the roadway lying next to its track.[14]

In Kansas, in a proceeding to recover damages for the construction of a railroad across premises, it appeared that the farm contained about 65 acres, and by the construction of the road was cut into two pieces, one containing about 3 acres. On cross-examination, a witness for the owner was asked whether, by reason of the fence that would be built by the company, the strip would not probably sell to the adjacent owners for more than if the road had not been constructed, and what the other portion would be worth if owned by one person and the strip by another, and the railroad was not built. The Supreme Court holds the error in excluding this testimony, if any, was cured by the subsequent statement of the witness that the main portion of the land was worth less after the construction of the road than before.[15]

Injuries to Passengers, Employes and Strangers.

In Minnesota the plaintiff entered a car at the station to be carried to a certain place. The train was filled, but before he learned he could get no seat, the train was going at a high rate of speed. He asked the conductor to provide him a seat, but the conductor refused. On his fare being demanded, plaintiff offered to pay it if a seat were provided him, but refused to pay it unless a seat were provided. The conductor then stopped the train and ejected him. The Supreme Court rules that plaintiff had a right so to refuse to pay the fare, and he did not thereby become a trespasser on the train; for a passenger has a right to be provided with a seat.[16]

In the same state the same Court rules that a railroad company may charge more as fare to those paying on the train than it charges for tickets purchased before entering the train. The condition attached to such right to discriminate, that the company shall give to persons desiring to travel on one of its trains a reasonable opportunity to purchase tickets, does not require it to keep its ticket office open within such time, before the departure of the train, that a person cannot procure a ticket and get upon the train before it begins to move.[17]

In the same state the Supreme Court holds that where it is charged that the servants of a railroad willfully threw a person from the cars while they were in motion it is immaterial whether he was a passenger or a trespasser. "It would be entirely immaterial whether plaintiff was a passenger or a trespasser. If it were the latter, defendant could have no right to put him off the cars while in rapid motion, so as to endanger his life, and would no more be justified, under such circumstances, in ejecting him from the steps than from the interior of the car."[18]

In Colorado the Federal Court rules that engineers in different trains of the same company are "fellow-servants," and one cannot recover damages against the company for injury caused by the negligence of the other.[19]

In Washington Territory an employé of a railroad was injured by the falling of a pulley, caused by a wheel working from its shaft impinging upon and unscrewing the nut holding it on the shaft. The nut should have been so fastened that the friction would tighten it. The defect was known to defendant, but not to plaintiff. The Supreme Court holds that the injury was caused by a latent defect, for which defendant was liable.[20]

In Alabama, a night watchman about a station was accustomed to go upon defendant's trains to a distant station for his meals, and, while going thither on a freight train, was asked by the conductor, one of the brakemen being sick, to make a coupling for him, in doing which he was injured. The Supreme Court rules, that there was no such employment as brakeman as rendered the company liable for the injury.[21]

1 Thompson v. Penn. R. R. Co., 13 Cent. Rep., 299.
2 Hill v. Kahoka, 35 Fed. Rep., 32.
3 St. L., Ft. S. & W. R. Co. v. Grove, 18 Pac. Rep., 958.
4 Ga. Pac. R. Co. v. Propst, 4 South. Rep., 711.
5 Barry v. M., K. & T. Co., 34 Fed. Rep., 829.
6 State v. N. P. R. Co., 38 N. W. Rep., 635.
7 Spencer v. Penn. R. Co., 34 Fed. Rep., 899.
8 Casey v. Butterfield, 35 Fed. Rep., 77.
9 Cowan v. M. P. R. Co., 35 Fed. Rep., 43.
10 Sullens v. C., R. I. & P. R. Co., 38 N. W. Rep., 545.
11 Rinear v. G. R. R. Co., 38 N. W. Rep., 599.
12 Lafferty v. C. & W. M. R. Co., 38 N. W. Rep., 669.
13 Osborne v. Mo. Pac. R. Co., 35 Fed. Rep., 84.
14 Penn. R. Co. v. Ayres, 13 Cent. Rep., 292.
15 L. & W. R. Co. v. Hollis, 18 Pac. Rep., 947.
16 Hardenberg v. St. P., M. & M. R. Co., 38 N. W. Rep., 625.
17 State v. Hungerford, 38 N. W. Rep., 628.
18 Mykleby vs. St. P., M. & O. R. Co., 38 N. W. Rep., 763.
19 Van Enery v. M. P. R. Co., 35 Fed. Rep., 40.
20 C. & P. S. R. Co. v. Hawthorn, 19 Pac. Rep., 25.
21 Ga. Pac. R. Co. v. Propst, 4 South. Rep., 711.

General Railroad News.

MEETINGS AND ANNOUNCEMENTS.

Dividends.

Dividends on the capital stocks of railroad companies have been declared as follows:

Chicago, Burlington & Quincy, 1 per cent., quarterly, payable Dec. 25.

North Pennsylvania, quarterly, 2 per cent., payable Nov. 25.

Meetings.

Meetings of the stockholders of railroad companies will be held as follows:

Arkansas & Gulf, special meeting, Arkansas City, Ark., Dec. 1.

Baltimore & Ohio, annual meeting, Baltimore, Md., Nov. 19.

Canadian Pacific, special meeting, Nov. 19, Montreal, Can.

Buffalo, Rochester & Pittsburgh, annual meeting, 20 Nassau street, New York, Nov. 19.

Denison & Washita Valley, special meeting, Denison, Tex., Dec. 1.

East Tennessee, Virginia & Georgia, special meeting, Knoxville, Tenn., Dec. 22, to consider theapproval of the lease to the Richmond & Danville.

Fort Worth & Denver City, annual meeting, Fort Worth, Tex., Dec. 11.

Georgia Pacific, annual meeting, Birmingham, Ala., Nov. 28.

New York, Lake Erie & Western, annual meeting, 21 Cortlandt street, New York, Nov. 27.

New York & New England, annual meeting, Boston Mass., Dec. 11.

Old Colony, annual meeting, United States Hotel, Boston, Mass., Nov. 27.

Pittsburgh & Connellsville, annual meeting, Pittsburgh, Pa., Dec. 3.

Richmond & West Point Terminal Railway & Warehouse Co., annual meeting, Richmond, Va., Dec. 11.

St. Louis Southern, annual meeting, Pinckneyville, Ill. Nov. 21.

Suspension Bridge & Erie Junction, annual meeting, 21 Cortlandt street, New York, Nov. 27.

Railroad and Technical Conventions.

Meetings and conventions of railroad associations and technical societies will be held as follows:

The *American Association of Railway Chemists* will hold its next meeting in Baltimore, Md., Jan. 14, 15 and 16.

The *New England Railroad Club* meets at its rooms in the Boston & Albany passenger station, Boston, on the second Wednesday of each month.

The *Western Railway Club* meets the third Tuesday in each month in the Phenix Building, Chicago.

The *New York Railroad Club* meets at its rooms, 113 Liberty street, New York City, at 7:30 p. m., on the third Thursday in each month.

The *Central Railway Club* meets at the Tifft House, Buffalo, the fourth Wednesday of January, March, May, August and October.

The *American Society of Civil Engineers* holds its regular meetings on the first and third Wednesday in each month, at the House of the Society, 127 East Twenty-third street, New York.

The *Boston Society of Civil Engineers* holds its regular meetings at its rooms in the Boston & Albany station, Boston, at 7:30 p. m. on the third Wednesday in each month.

The *Western Society of Engineers* holds its regular meetings at its hall, No. 67 Washington street, Chicago, at 7:30 p. m., on the first Tuesday in each month.

The *Engineers' Club of Philadelphia* holds regular meetings at the house of the Club, 1,122 Gerard street, Philadelphia.

The *Engineers' Society of Western Pennsylvania* holds regular meetings on the third Tuesday in each month, at Pittsburgh, Pa.

The *Engineers' Club of Kansas City* meets at Kansas City, Mo., on the first Monday in each month.

The *Civil Engineers' Society of St. Paul* meets at St. Paul, Minn., on the first Monday in each month.

The *Montana Society of Civil Engineers* meets at Helena, Mont., at 7.30 p. m. on the third Saturday in each month.

The *Arkansas Society of Engineers, Architects and Surveyors* will hold its second annual meeting at Little Rock on Nov. 22, 23 and 24, 1888.

Engineers' Club of Kansas City.

A regular meeting was held Nov. 5. Mr. W. H. Breithaupt, of the Committee on Highway Bridges, read a draft of a bill prepared to be presented to the State Legislature. A paper on Electric Railways was read and discussed.

Engineers' Club of Philadelphia.

At the regular meeting of Nov. 3, 1888, Mr. Henry M. Sperry, Supervisor of Signals, Pennsylvania railroad, presented a paper, illustrated by model, on the Details of Interlocking Switches and Signals.

"Signalling is destined to play an important part in the operations of railroads. It can be divided into two branches, block signalling and interlocking. The absolute and the permissive block systems are used on the Pennsylvania railroad: the former is the best, as it insures a definite distance between trains at all times. The automatic pneumatic block system, operated by the train, requiring no operators, has been successfully operated for a short distance on the Pittsburgh Division.

"The interlocking system, in addition to its safety features, is a great labor-saving device, as one man can readily do the work of two or more, on account of its concentration of levers, and he is compelled by the locking mechanism to correctly set the switches of the various routes before he can clear his signals. Four styles of interlocking machines are now made in the United States, and at least three times this number in England. The first machine in this country was put up in 1875, at East Newark, on the New York Division of the Pennsylvania Railroad, and is still giving good service."

Prof. C. Herschel Koyl, visitor, followed with an illustrated description of his parabolic semaphore, which was illustrated in the *Railroad Gazette* Oct. 19, 1888.

At the request of M. da Costa, Brazilian Chargé d'Affaires, Prof. L. M. Haupt presented a description of the plans proposed by M. Caland of Holland, for the improvement of the bar at the mouth of the Rio Grande do Sul in Brazil, by the usual jetties in pairs. The total length was about five miles and the estimated cost nearly eight million dollars, without dredging. Prof. Haupt described the physical features of the site, stated the importance of opening the ports of Brazil, and the attempts to do so by American and foreign engineers, and concluded that the jetty system would not be successful in such cases, where the channel was dependent upon the tidal scour from the Lagune dos Patos, which must be filled from the sea by a free admission of the flood-tide.

He then suggested that a sand and wave barrier of a crescent form, resting on the bar in such a position as to defend the main ebb-channel from the encroachments of the bar, conserving the energy of the ebb discharge and affording a free ingress of the flood tide, would best fulfill the required conditions and at a cost of less than one-half that proposed.

The subject was discussed by Messrs. S. S. Evans, Benjamin Franklin and H. W. Spangler, Active Members of the club, and Mr. A. S. Coffin, visitor, and the opinion prevailed that the parallel or convergent jetties of M. Caland would merely push the bar seaward without producing beneficial results. The cases of Aransas Pass, Texas, Newburyport, Mass., and Nantucket, were cited as instances of similar effects.

Technical Society of the Pacific Coast.

At a regular meeting held Sept. 7, 1888, Mr. Herrmann Kower was elected a member of the Society. Mr. A. F. Price read a paper on "The Copper Mines of Rio Tinto, Spain." Mr. E. J. Molera moved that a committee be appointed to draft suitable resolutions in memory of the late George J. Specht. The chair appointed the following committee: E. J. Molera, G. F. Allardt and F. Gutzkow.

At a regular meeting held Oct. 5, 1888, Mr. Luther Wagoner read a paper on the "Walnut Grove Dam, Arizona Territory." Mr. Luther Wagoner stated that through the courtesy of Lieut. Gilmore, U. S. Government Inspector of Steel for the cruisers "Charleston" and "San Francisco," he would soon make a series of tests of twisted bars of iron and steel, and that the results of his experiments would be duly reported to the Society.

The committee appointed to draft suitable resolutions of respect to the memory of the late George J. Specht presented a sketch of his career, and resolutions expressing his services to the Society and to his profession.

New England Railroad Club.

"Running Gear for Freight Cars, with the Possibilities of Adopting a Standard Truck for the Railroads of America," was discussed by the New England Railroad Club on the evening of 14th inst Mr. Osgood Bradley, the well-known Worcester car builder, was announced to open the debate.

PERSONAL.

—William Brown, Vice-President of the Cape Girardeau Southwestern, died suddenly on a train of that road, Nov. 6

—W. Deuel, Assistant Superintendent of the Wyoming Division of the Union Pacific, has resigned and has been succeeded by R W. Baxter, formerly Trainmaster of the Wyoming Division.

—J. H. Sessions, Assistant General Freight Agent of the Ohio, Indiana & Western, has resigned to accept a position as General Agent of the Baltimore & Ohio and the Columbus & Cincinnati Midland at Columbus, Ohio.

—J. J. Burns, who has been appointed Superintendent of Transportation of the Denver & Rio Grande, has been with the Union Pacific for a number of years, and was until recently, General Purchasing Agent of that road.

—C. A. Jewett has been appointed Acting General Freight and Passenger Agent of the Kansas City, Wyandotte & Northwestern, to succeed A. S. Dodge, who resigned to accept the position of General Freight Agent of the Missouri, Kansas & Texas.

—H. M. Smith, who has been appointed Chief Engineer of the Rome & Decatur, has been Chief Engineer of the Anniston & Atlantic during its construction, and has also been a resident engineer in the construction of the Georgia Division of the East Tennessee, Virginia & Georgia.

—MM. René Lefebre, Chief Engineer of Public Improvements in France; Henry Montgolfier, of Paris, and Baron Kamper, of Paris, were in Poughkeepsie, N. Y., on Wednesday of this week, on a visit of inspection to the Poughkeepsie bridge. They were escorted by Messrs. T. C. Clarke and J. F. O'Rourke.

—John W. Davis, First Assistant to Robert Garrett when the latter was President of the Baltimore & Ohio road, died last week in Baltimore. Mr. Davis at the time of his death had charge of the tax department of the Baltimore & Ohio road. He was 65 years of age, was well known among railroad men, and was with the Pennsylvania for a number of years prior to his connection with the Baltimore & Ohio.

—Col. S. H. Lockett, a well-known engineer, landed in New York last Tuesday, directly from Chili, to which country he went some months ago in the interests of Messrs. Comegys & Lewis and the Union Bridge Co., in the matter of the contract for building and equipping railroads for the Chilian Government. Colonel Lockett brings interesting information concerning the very important enterprise which seems to have been successfully and fortunately conducted so far.

—Nelson C Thrall, whose appointment as Assistant to the President of the Northern Pacific we announced last week, has been in the General Manager's office for six years. Prior to his connection with the Northern Pacific, Mr. Thrall was Secretary to E. S. Bowen, General Superintendent of the New York, Lake Erie & Western. When Mr. Oakes went West in 1883 to assume charge of the Northern Pacific, he found Mr. Thrall Chief Clerk in the General Manager's office, and, while he has never had any title beyond that of Chief Clerk, he has been the trusted assistant of Mr. Oakes for several years.

—D. C. Walsh, Chief Clerk of the Passenger Department of the Pennsylvania, has been appointed Division Ticket Agent of the Philadelphia, Wilmington & Baltimore, vice George A. Dadmun, deceased. Mr. Walsh has been 30 years in railroad service and has been Chief Clerk of the Passenger Department of the Camden & Amboy, and when the Pennsylvania absorbed that road in 1872 he assumed charge of the rates and excursion business of the eastern territory of the Pennsylvania. This position he held up to February of 1882, when he was appointed Chief Clerk of the Passenger Department.

—Frederic A. Potts, President of the New York, Susquehanna & Western Railroad, died in New York Nov. 9, after an illness of three weeks. Mr. Potts was born in Pennsylvania, April 4, 1836. In 1865 he became a partner in the coal firm in which his father was interested, and about 1880 he organized the great coal firm of F. A. Potts & Co. The railroad career of Mr. Potts began in 1877, when he was elected a director of the Central of New Jersey, a place which he held for five years. He became largely interested in the New Jersey Midland, and on the consolidation in June, 1881, of the Midland and other smaller lines, he was chosen President of the new company, the New York, Susquehanna & Western. He was also Vice-President of the National Park Bank of New York, a director of the Mutual Benefit Life Insurance Co., of Newark, and of other associations.

ELECTIONS AND APPOINTMENTS.

Americus, Preston & Lumpkin.—B. R. Hardaway, Chief Engineer, has been appointed Superintendent, with headquarters at Americus, Ga., in place of J. N. Bass, deceased.

Anniston & Atlantic and Anniston & Cincinnati.—H. L. Wright has been appointed General Freight and Passenger Agent of these roads, with headquarters at Anniston, Ala. Paul Roberts has been appointed Auditor.

Bessemer & Birmingham.—The incorporators are: I. R. Hochstader, A. Steiner, Joseph Beitmann and A. Lemore, of Birmingham. The officers are: Joseph Beitmann, President; E. Lesser, Vice-President; B. Steiner, Treasurer; A. Lemore, Secretary. The Board of Directors is: Joseph Beitmann, I. R. Hochstader, B. Steiner, A. Lemore, H. Stulley, L. Braun and E. Lesser. The headquarters are in the offices of Beitmann Bros., Birmingham, Ala.

Brooklyn & Montauk.—The annual meeting of the company was held in New York last week and the following directors were chosen: Frederick D. Tappen, Alexander H. Stevens, William H. Jackson, E. B. Willett, William Floyd Jones, Charles E. Miller, Francis G. Lawrence, Jr., Daniel Lord, Austin Corbin, Henry Graves, J. Rogers Maxwell, Frederick W. Dunton and Henry W. Maxwell.

Chicago, St. Paul & Kansas City.—The meeting for the election of directors of the company was held in Dubuque, Ia., last week, and all the old directors were re elected.

Cumberland Mountain Coal & Railroad Co.—The incorporators of this Tennessee company are: Benjamin W. Bradford, William A. Henderson, Charles Gerding, Reuben A. Davis, James H. Llewellyn and S. N. Vance.

Deadwood Central.—I. K. Miller is president of this Dakota company and A. W. Coe is Secretary. The office of both is at Deadwood.

Denver & Rio Grande.—The following is the official announcement of J. J. Burns' appointment as Superintendent of Transportation: "John J. Burns is hereby appointed Superintendent of Transportation, with headquarters at Denver (room 23, Union Depot). The Superintendent of Transportation will have the general supervision and control of all business relating to the transportation department. He will direct the movement of trains, the distribution of car and engine equipment, and will report to the General Manager." The office of Superintendent of Telegraph has been abolished, and the duties of that office will hereafter be performed by the Superintendent of Transportation.

Emery County.—The incorporators of this company are: A. H. Swan, of Cheyenne, Wyo.; W. W. Bishop, of San Francisco, Cal., and William VanDyke, J. R. Middlemis, Robert Robinson, W. R. Swan, J. J. Sullivan, F. N. Lafrantz, J. T. McIntosh and W. R. Williams, of Ogden, Utah.

Fremont, Elkhorn & Missouri Valley.—Horace G. Burt has been appointed General Manager, with headquarters at Omaha, Neb., to succeed W. F. Fitch, resigned.

Georgia, Carolina & Northern.—J. A. Dodson has been appointed Superintendent, with headquarters at Monroe, N. C. T. H. Wright has been appointed Auditor of Ticket Accounts, with headquarters at Wilmington, N. C. D. S. Hudgings has been appointed Car Accountant, with headquarters at Raleigh, N. C.

Highland & Denver.—The following are the officers of the road: H. A. W. Tabor, President; R. H. Gilmore, Vice-President; J. H. Vincent, Secretary. The general office is at Denver.

Kansas City, Fort Scott & Memphis.—The following appointments are made, to take effect Nov. 1: W. W. Fagan, General Superintendent, with office at Kansas City; R. H. Elliott, Consulting Engineer, with office at Kansas City. In addition to his duties as Chief Engineer of the Kansas City, Memphis & Birmingham, he will, after Jan. 1 next, have supervision of all new construction. L. W. Towne, Car Service Agent, with office at Kansas City. He will also act as Claim Agent, and as such will have charge of all stock, fire and personal injury claims.

Kansas City, Wyandotte & Northwestern.—C. A. Jewett has been appointed Acting General Freight and Passenger Agent, vice A. S. Dodge, resigned.

Kentucky Union.—F. D. Carley, President, has also assumed the duties of General Manager. H. C. McDowell has been elected Vice-President, in place of John Boyle. L. T. Rosengarten has been elected Secretary and Treasurer, in place of C. T. Collings.

Lake Shore & Michigan Southern.—E. A. Handy has been appointed Engineer of the Eastern division, with headquarters at Cleveland, vice G. S. Dunham transferred.

Manhattan Elevated.—C. W. Chapin, Sidney Dillon, Cyrus W. Field, Jay Gould, George J. Gould, Edwin Gould, R. M. Gallaway, John H. Hall, J. Pierpont Morgan, Russell Sage, Samuel Sloan, Simeon Wermser and S. V. White were re-elected directors at the annual meeting in New York city this week. The directors elected Jay Gould, President; R. M. Gallaway, Vice-President, and D. W. McWilliams, Secretary and Treasrer.

Meriden, Waterbury & Connecticut River.—The old board of directors were re-elected at the annual meeting in Meriden, Conn., Nov. 13.

Mexican National.—B. L. Babb, Car Accountant of the New York, Pennsylvania & Ohio, has been appointed Superintendent of Car Service to take effect Dec. 1.

Missouri, Kansas & Texas.—W. B. Lyons has been appointed Superintendent of the Hannibal and Parsons divisions, and J. W. Maxwell, Superintendent of the division south of Parsons.

Missouri Pacific.—The office of Traffic Manager, recently filled by O. G. Murray, has been abolished.

New York, Chicago & St. Louis.—Thomas B. Heindle, late foreman of the shops at Conneaut, O., has been appointed Master Mechanic of the shops at Stony Island, Ill.

Northern Pacific.—A. L. Horner has been appointed Superintendent of the Pacific division, with headquarters at Tacoma, Wash. Ter.

Philadelphia, Wilmington & Baltimore.—D. C. Walsh, formerly in the office of the General Passenger Agent at Philadelphia, has been appointed Division Ticket Agent in the place of G. A. Dadmun, who recently died.

Richmond & Allegheny.—President Ingalls has appointed J. T. Odell General Superintendent and William Garstang Superintendent of Motive Power.

Rome & Decatur.—H. M. Smith has been appointed Chief Engineer in charge of the roadway department.

Schuykill Junction.—James B. Washington, of Allegheny County, is President of this new Pennsylvania line, and among the stockholders are J. Van Zandt Smith, Theodore Frothingham, J. D. McChubben and Thaddeus L. Vanderslice, of Philadelphia.

Sioux Falls, De Smet & Northern.—The following officers have been elected: President, J. H. Carroll, De Smet, Dak.; Vice-President, William Stoddard, Groton, Dak.; Secretary, C. B. Macdonald, De Smet; Chief Engineer, M. S. Parker, Winona, Minn.; Chief Attorney, J. F. Watson, De Smet.

Southern Central.—The annual meeting was held in Auburn, Nov. 14. The following directors were chosen: Thomas C. Platt, E. P. Wilbur, John N. Knapp, William Stevenson, Henry L. Storke, Jeremiah P. Cady, James G Knapp, E. D. Clapp, John W. Dwight, Royal W. Clinton, John Taylor, Dexter A. Smith, E. R. Robinson. At a subsequent meeting of the directors the following officers were re-elected: President, Thomas C. Platt; Vice-President, J. N. Knapp; Secretary, D. A. Smith; Treasurer, H. L. Storke; Managing Director, William Stevenson; Traffic Manager, John Taylor; Executive Committee, T. C. Platt, John N. Knapp, James G. Knapp, D. A. Smith, H. L. Storke, R. W. Clinton and J. W. Dwight.

Texas, Santa Fe & Northern.—Charles Johnson has been appointed General Superintendent in place of E. R. Dougherty, resigned. He will also have charge of the general freight and passenger accounts, vice E. Lewis, relieved.

Union Pacific.—C. F. Resseguie has been appointed Superintendent of the Nebraska Division, with office at Omaha, to succeed R. Blickensderfer, resigned. J. Rapelje, Assistant Superintendent of the Colorado Division, has been appointed Superintendent of the Idaho Division, with office at Pocatello, Idaho, to succeed Mr. Resseguie.

Union Pacific, Lincoln & Colorado.—The first directors and officers of this company are: C. F. Adams, F. L. Ames, F. G. Dexter, E. Atkins and M. D. Spaulding, of Boston; J. S. Cameron, of Omaha, and A. L. Williams, of Topeka. The officers are: C. F. Adams, President; F. L. Ames, Vice-President; James G. Harris, Treasurer; Alexander Miller, Secretary. The principal offices of the company will be at Topeka and Denver.

Wickes Refrigerator Co.—Powell Evans has been appointed Agent at Buffalo, N. Y. His office will be in the Coal and Iron Exchange (253 Washington street).

Winona & Southwestern.—The following are the names and address of the incorporators of the Winona & Southwestern Construction Co.: William McIntyre, H. W. Lamberton, John Robson, V. Simpson, Charles Horton, R. D. Cone, E. S. Youmans, A. B. Youmans, A. F. Hodgkins, J. L. Norton, W. H. Laird, M. G. Norton and Andrew Hamilton, of Winona. The officers are: President, William McIntyre; Vice-President, H. W. Lamberton; Secretary, E. G. Hornbrooke; Treasurer, M. G. Norton.

Zanesville & Ohio.—B. C. Winstanley has been appointed Traffic Manager, with office at Zanesville, Ohio.

OLD AND NEW ROADS.

New Companies Organized.—Cumberland Mountain Coal & Railroad Co.; Los Angeles, Utah & Atlantic; Pittsburgh, Cadiz & Ohio; Schuylkill Junction.

Albert Southern.—Work has been suspended on this road, which was being constructed from Albert to Alma, N. B., and the laborers who were at work on the road are destitute and greatly in debt, not having received their wages for many months. Eleven miles of the road have been completed, and the remaining six miles are partly graded.

Birmingham, Mobile & Navy Cove.—It is reported that General Manager T. McNulty has succeeded in placing $3,000,000 bonds in New York, and that work on the construction of the road will be commenced in 60 days. The company proposes to build a line from Mobile Ala., to Navy Cove, a deep water harbor on the east coast of Mobile Bay.

Canadian Pacific.—Work is now in progress near London, Ont., on the extension of the road from that place via Chatham to Windsor, 112 miles. The work is being done by the company's men and will be continued in the heavy cuttings during the winter. The contracts for the balance of the line will probably be let late in the winter or early in the spring. The company will hold a specialmeeting in Montreal, Can., next week for the purpose of considering the authorization of a lease of the extension from the Ontario & Pacific, and of the ferry boats and other vessels to be employed; and also the terms and conditions of an agreement between the two companies for securing the speedy completion of the extension.

Chicago & Atlantic.—Judge Gresham in the United States Circuit Court for Indiana, has begun the hearing of the case of the Farmer's Loan & Trust Co. of New York against this railroad, which extends from Chicago to Marion, Ind., 269 miles. The Loan & Trust Co. seeks to foreclose two mortages, one for $6,500,000, executed in 1881, and the other for $5,000,000, executed in 1883. The road defaulted in the payment of interest on Nov. 1, 1884. The New York, Lake Erie & Western paid the interest on the mortgages up to 1884. The second mortgage bondholders claim that the first mortgage is invalid because the railroad company was improperly organized, and that the Farmers' Loan & Trust Company, which is the trustee, is not an Indiana corporation. The Chicago & Atlantic does not oppose the foreclosure, though it is solvent. It claims that the interest was not paid because the New York, Lake Erie & Western failed to carry out its agreement to advance the interest money out of its earnings from Chicago & Atlantic business.

Chicago, Burlington & Northern.—The company has filed a petition in Dubuque, Ia., for an injunction against the Illinois Central. The petition recites that the Dubuque City Council has given the Chicago, Burlington & Northern right of way along Iowa street east of the Illinois Central tracks from Sixth street to the Central Stock-Yards. It alleges that the Illinois Central has lately been moving its main track between these points east so that it trespasses on the right of way possessed by the Chicago, Burlington & Northern. Judge Linehan granted a temporary injunction restraining the Illinois Central from further work in this direction. The Central will file a motion to dissolve the injunction.

Chicago, Burlington & Quincy.—At a meeting in Boston last week the directors decided to declare a dividend of one per cent., making five per cent. for the year. The dividend is declared from the net earnings of the current quarter (ending Dec. 31), payable Dec. 15

Cleveland, Canton & Southern.—This is the name under which the Cleveland & Canton will be known when the gauge has been changed to standard and its Southern extensions and branches have been completed and opened for traffic.

Cumberland Mountain Coal & Railroad Co.—Charter filed in Tennessee to construct a road from a point on the Cincinnati Southern, at or near New River Station, in Scott County, to the Walden River road, and thence to the navigable waters of the Clinch River.

Denver, South Park & Pacific.—The Central Trust Co., of New York, has begun in the United States District Court, at Denver, a foreclosure suit against this road as principal, and the Union Pacific as an interested party, for the recovery of the principal of $2,500,000, and interest, which has not been paid since January, 1884, and which now amounts to $1,000,000. The principal is secured by a first mortgage on 208 miles of road, rolling stock and equipment. The plaintiff also alleges that the company is insolvent, and prays the Court to appoint a Receiver. The Union Pacific becomes party to the suit because of transfer to it of all rights and franchises of the Denver, South Park & Pacific by that company subsequent to the transactions between the Central Trust Co. and this road.

Dubuque & Sioux City.—A mortgage has been filed in several counties in Iowa by Trustees Hackstaff and Gibson for $3,000,000. The money is to be used to satisfy a previous mortgage and for improving the roadbed and in purchasing new rolling stock.

Duluth, Red Wing & Southern.—The company has filed in Minnesota a copy of a first mortgage given to the Central Trust Co., of New York, in trust. It covers all the lines and property of the road, now owned or hereafter acquired, and provides for the issuance of bonds in the sum of $20,000 a mile.

Duluth, South Shore & Atlantic.—The company has made arrangements with the Central Trust Co., of New York, for a loan of $4,000,000, and the mortgage to secure the loan will soon be recorded in the various counties through which the road runs. The funds thus secured will enable the company to carry out improvements which have been planned and to equip the road for a heavy through traffic,

Elgin, Joliet & Eastern.—This road will be opened for traffic this week. The line is about 60 miles long, and extends from Spaulding, on the Chicago, Milwaukee & St. Paul, to McCool, on the Baltimore & Ohio. Besides this main line there is a branch from Plainfield to Gardner, 32 miles, to reach the immense coal fields in that locality. The prime object of this road circling around Joliet is to form a belt line, over which freight for through points, either east or west, can be sent without passing through Chicago. L. B. Jackson is the Chief Engineer. George O. Clinton is General Manager. The road connects with nearly all the roads entering Chicago.

Emery County.—Articles of incorporation filed in Utah Ter., with a capital stock of $40,000 to build a short coal road from Panthers' Canon mines to a connection with the Denver & Rio Grande Western.

Flint & Pere Marquette.—The company has arranged for a consolidation of the Flint & Pere Marquette, the East Saginaw & St. Clair, the Saginaw & Mount Pleasant, the Saginaw & Clare County and the Manistee railroads, which will take effect on May 15, 1889. These last named corporations are owned by the Flint & Pere Marquette, and are consolidated merely for the sake of economizing and simplifying matters preparatory to building to Detroit. The capital, stock and debt of the Flint & Pere Marquette are not altered by the consolidation.

Freehold & New York.—The company, as reorganized, has taken possession of the property and franchises of the old Freehold & New York Railroad, which were sold by order of the court Sept. 24. The officers are: President, Edward D. Adams; Secretary and Superintendent, J. E. Ralph. The new company assumes the business of the road from and including Sept. 25.

Gloucester & Atco.—The specifications for the contemplated work have been completed by the chief engineer, and after being submitted to the officials of the road, bids for the work will be invited from contractors. George A. Morris, of Gloucester, N. J., is the chief engineer.

Grand Southern (New Brunswick).—The plan for the reorganization of this company is now under consideration, and it is expected that it will be arranged in a short time and the line taken out of the Receiver's hands. The road was purchased a few months ago at foreclosure sale by Russell Sage, representing the bondholders.

Highland & Denver.—This company has been organized to build about nine miles of suburban motor lines in connection with a cable line into the city of Denver, Col.

The following suburban roads about Denver are also projected: South Broadway, 2½ miles; Orr Legge and J. A. Fleming are among the projectors. South Capital Hill, Milo A. Smith, Manager; suburban line connecting with Denver Tramway Cable Line in Denver, Col.; Alameda Avenue Motor Line, Denver, Col., five miles, S. G. Collins, 901 Lawrence street, Denver, is Manager.

International.—It is stated that the company has decided to build a branch road from Benito to Monterey, connecting with Tampico

Kansas City, Watkins & Gulf.—This road is projected to extend from Lake Charles, La., through Shreveport, La., Texarkana, Ark., to Fort Smith and Kansas City, Mo. The survey has now been completed for the first 150 miles from Lake Charles. J. B. Watkins, of Lawrence, Kan., is President, and P. H. Philbrick, of Lake Charles, La., is Chief Engineer.

Kentucky & Indiana Bridge Co.—Dr. W. L. Breyfogle, of Louisville, Ky., last week filed in the Chancery Court there a petition that a Receiver be appointed to take charge of the affairs of the Kentucky & Indiana Bridge Co., owning and operating the Kentucky & Indiana Bridge across the Ohio at Louisville and the road running between Louisville, Ky., and New Albany, Ind., 10 miles. Dr. Breyfogle complains that the directors were by their action imperiling the property, and that he, as one of the largest stockholders, had been refused the privilege of looking at the company's books. He said that the directors were by far overstepping the power vested in them by their charter; that they had made contracts that they had no right to make, and had placed the company's affairs in such a condition that a Receiver was necessary. The Court took the petition under advisement and no answer has yet been made. Nov. 8 the stockholders held a meeting at the offices in Louisville, and out of 17,000 shares of stock represented, 14,030 voted to sustain the action of the directors.

Los Angeles, Utah & Atlantic.—The company has filed a charter in California, with a capital stock of $1,000,000. The object is to build and operate a road from San Pedro Bay, near Los Angeles, to the eastern boundary of the state. Among the directors are J. C. Marble, of Van Wert, Ohio, and C. W. Scott, of Manistee, Mich.

Nashville & Knoxville.—Tracklaying has been commenced on the section between Gordonville and Carthage, Tenn., and several miles have now been completed. It is probable that the line will be opened for traffic late in December.

Northern Maine.—The surveyors for this road have completed the survey of the line from Mattawamkeag, on the Maine Central, to Houlton, a distance of 72 miles. The survey will be continued immediately to Presque Isle.

Pensacola & Memphis.—Chief Engineer J. W. Gallup states that the construction of the line will be soon resumed and continued until the road is completed to Meridian, Miss. Work was commenced on the road some months ago at Pensacola, Fla., to prevent the forfeiture of municipal franchises, but stopped when the requirement had been fulfilled. Much of the stock of the road has recently changed hands, and it is stated that it is now largely held by A. W. Johnson and M. G. Kimball.

Pittsburgh, Cadiz & Ohio.—Organized at Zanesville, O., to construct a road to extend from the Pennsylvania state line in Columbiana County, O., to McConnellsville, crossing the Ohio at Wellsville. Albert E. Boone, of Zanesville, is President of the company.

Poughkeepsie & Connecticut.—This is a corporation formed by the syndicate controlling the Poughkeepsie Bridge and the Hartford & Connecticut Western to build a line from the bridge to Silvernails on the latter road, 26½ miles. The contract for grading and tracklaying is let to Charles McFadden, of Philadelphia, and the work is to be completed by Feb. 1.

St. Louis, Alton & Springfield.—The transfer of the line from the St. Louis & Central Illinois has now been all completed, and the above company now has a clear title to the line from Bates to Grafton, Ill., 85 miles. Tracklaying on the extension from Newberne to Alton, 15 miles, will be resumed, and the line will probably be completed in December.

Savannah, Griffin & North Alabama.—Judge M. J. Clarke, of the Alabama Superior Court, has issued an order for the appointment of a Receiver. In July, 1887, Gen. E. P. Alexander, as President of the Central of Georgia, and as trustee for this road, filed a bill to foreclose a mortgage given to secure the first mortgage seven per cent. bonds amounting to $500,000. Some time after this date a minority of the stockholders in the Savannah, Griffin & North Alabama, filed a bill to enjoin the bill secured by Gen. Alexander, and allow time to present a defense against the foreclosure asked for. The minority also sought to have the Central of Georgia included in the record, on the ground that that company, contrary to the provisions of its charter, had come to own about seven-tenths of the stock.

Savannah & Tybee.—Argument was heard this week on an order granted to the Oglethorpe Savings & Trust Co. requiring the directors to show cause why a receiver should not be appointed to consolidate the assets of the company, and report to the court what are the assets and obligations of the company. It is said this is the beginning of litigation looking to a reorganization of the company and the probable sale of the road to those who will extend and equip it.

Schuylkill Junction.—The company has filed articles of incorporation in Pennsylvania to build a road seven and a half miles in length, extending from Thirtieth street, Philadelphia, to Second street and Cheltenham avenue, the county line. The capital stock is $1,000,000. It is said that another company will probably be organized in Montgomery County to extend the line to the North Pennsylvania road, thus forming a direct connection with the Philadelphia & Reading's New York line. This will, in connection with other Reading tracks, give the Baltimore & Ohio a connection by which it can run trains through to New York.

Tennessee & Coosa.—The suspension of work on the extension from Gadsden to Guntersville and thence to Huntsville, Ala., last September, has been followed by the almost complete suspension of operation on the old road between Attala and Gadsden, no trains being now run over the road except a Gadsden dummy, which makes three trips a day.

Tobique Valley.—The contractors for this short New Brunswick road are: Rainsford Lovely, William Hale, Wilbert Armstrong & Co., Thomas Withers & Co., David Murphy, James Miller and James Stewart. They have about 200 men employed. It is expected that all the light work on the road will be done this winter, so that the heavier work can be started in the spring. The road is 14 miles in length, extending from Andover, N. B., to Plaster Rock, where there are large quarries.

Toledo, Ann Arbor & North Michigan.—The company commenced operating the Toledo, Saginaw & Durand on Nov. 12. The road extends from Durand, Mich., north to East Saginaw, Mich., a distance of 52 miles.

Union Pacific.—Peter A. Dey, James W. Savage and George M. Bogue, the arbitrators to whom was submitted the question of a division of rates on through business between the Union Pacific and the Oregon Short Line, have rendered their decision, which is slightly in favor of the Short Line. The report says:

The general statement that the Oregon Short Line has been allowed one and one-half or one and three-quarter miles to one mile on the Union Pacific is not strictly correct. In many cases an arbitrary rate has been allowed the Short Line of $1.55 per ton between Granger and Pocatello, which amounts to only .721 cents per ton per mile, which rate cannot be considered a fair allowance, as it is lower than the trunk lines west of Chicago and but little higher than the trunk lines east of Chicago, with their enormous tonnage and rich local territory.

We have reached the conclusion that the division recommended by the government directors in 1882—1¾ to 1—is an equitable division for passenger and freight traffic to and from the Oregon Short Line and its branches for all freight hauled to and from Granger and Pocatello that goes over the Utah & Northern and is simply hauled from one point to the other, and that the mileage rate allowed should be the same as that allowed the main line. We would suggest that this adjustment be retroactive and cover the entire operation of the road from its completion and that interest be allowed the Union Pacific on all amounts found by settlement on this basis to be due for money advanced to pay interest on bonded indebtedness. While from the papers submitted it is, perhaps, hardly to be expected that the foregoing modifications of the contract will materially decrease at first the indebtedness of the Short Line already accrued, it is believed that the increasing volumes of business from the territory traversed by that road will prevent any augmentation of it and in time give the stock an appreciable value.

Union Pacific, Lincoln & Colorado.—The companies of this name in Kansas and Colorado have filed articles of incorporation in Colorado. The Kansas company owns a railroad from Salina to Waldo, a line from Oakley to Colby, and a line from Lincoln to the west line of the state, together with various other lines and branches, now being built or under survey. The authorized capital stock is $20,000,000. The Colorado company was organized to build a road from a point on the eastern boundary line of Colorado, in Elbert or Arapahoe County, running thence westerly to Denver, with branches from this line to Manitou, in El Paso County; from the east line of Colorado in Bent County southwesterly to Canon City in Fremont County, then southwesterly through Bent and Las Animas counties to the south line of Colorado. The capital stock of this incorporation is $7,500,000.

By the terms of the consolidation, it is agreed that the capital stock shall be $27,500,000.

Wheeling & Lake Erie.—Sidney Dillon has just made an inspection trip over the road accompanied by M. D. Woodford, Vice-President and General Manager, and C. A. Wilson, Chief Engineer; Eugene Zimmerman, President of the Dayton, Fort Wayne & Chicago Road, and Henry A. Taylor, Director of the Cincinnati, Hamilton & Dayton; Henry F. Shoemaker, of New York; President Julius Dexter and Vice-President C. C. Waite, of the Cincinnati, Hamilton & Dayton. The above named persons own and control individually a majority of the stock in the Wheeling & Lake Erie, the Cincinnati, Hamilton & Dayton, and the Dayton, Fort Wayne & Chicago, and it was reported that it is the intention to unite their interests, possibly by forming a proprietary corporation which shall own a controlling amount of the stock of each road. The rumor, however, was denied by several of the gentlemen interested.

Winona & Southwestern.—The Winona & Southwestern Construction Co. has been organized at Winona, Minn., to construct this road from Winona to Mason City, Ia.

Wisconsin Central.—Regarding the recent rumors of a consolidation with the Northern Pacific, President Colby states that the actual relations with the Northern Pacific will continue about as they are at present. No deal is being considered. There will be a perfectly harmonious operation of the two roads.

Yazoo & Mississippi.—The tax cases against this company (a branch of the Illinois Central) have been decided by the Supreme Court of the state of Mississippi. The points involved in the cases are briefly, as follows: The charter of the company states that the road shall be exempt from taxation for 20 years, from its completion to a point on the Mississippi River. The road has been running since 1885, and lacks more than 75 miles of being completed to the river, and work has stopped, there being no preparation to complete it. The suit was brought by the counties of Hinds, Madison, Yazoo, Grenada and Leflare. Under an act passed by the last Legislature providing for the collection of taxes from railroads that have escaped taxation, the Court held that under the clause of the charter giving the exemption that the road is not entitled to the same until completion, and that it is subject to taxation since 1885. The judgment amounts to $59,521. The case will be carried to the United States Supreme Court, for which a writ of error is now being prepared.

TRAFFIC AND EARNINGS.

Traffic Notes.

The roads east of the Missouri River and west of Chicago which have agents in San Francisco have instructed their representatives in that city to discontinue the payment of ticket commissions to any one except resident ticket agents of terminal lines, and this action has led to the breaking up of the San Francisco Passenger Agents' Association. The payment of commissions to outside parties has led to much cutting of rates.

The Chicago roads have issued a joint notice to grain dealers announcing that deliveries of grain will not be made from points on one road to regular grain elevators located in or near Chicago, upon other roads, except with the consent of the receiving and delivering lines. The roads will also decline to make delivery of grain consigned or reordered to grain houses not provided with Board of Trade weighmasters.

All the roads out of Chicago have followed the Pennsylvania in reducing provision rates from Chicago to the seaboard. The rate on live hogs in car-loads has also been reduced to 25 cents by all roads except the Chicago & Atlantic. The Lake Shore has reduced its dressed beef rate from Chicago to Boston from 40 cents to 35, making it the same as to New York. The Canadian lines have been making this rate for some time past.

The Northwestern Passenger Association has gone to pieces. The use of mileage tickets for through trips and other irregularities between St. Paul and Chicago, which have been noted in these columns during the past few weeks, have unsettled rates to such an extent that several roads withdrew from the Association. This, together with the conviction that the roads in the Northwest cannot maintain an association wholly independent of the roads to the west and southwest of Chicago, led to the dissolution of the organization.

The Inter-state Commerce Commission.

The Commission rendered a decision Nov. 9 in the case of James C. Savery & Co. against the New York Central & Hudson River Railroad Co. and others, dismissing the complaint. The opinion states:

The matter of the reception of immigrants at the port of New York having been put by the laws of the state under the control of a Board of Commissioners of Emigration, and that board having made such regulations as it has deemed desirable for the protection of the immigrants until they are ticketed and put on board railroad trains for their respective ultimate destinations, and the Federal Government through its legislative and executive departments having sanctioned the control by the Commissioners of Emigration, the Inter-state Commerce Commission has no authority to interfere with their regulations.

Not having the authority to interfere directly and control the Commissioners of Emigration, it cannot do so indirectly by inhibiting the railroad companies from carrying out the arrangements made by the commissioners with them.

There is nothing illegal or wrongful in a railroad company making a rate for immigrants as a class and declining to give the same rate to others.

A railroad company which transports immigrants in unfit cars will be required to provide better accommodations, and to ascertain their fitness the Commission will make its own inspection.

The rates complained of in this case as excessive were voluntarily reduced pending the proceedings.

East-bound Passenger Rates from St. Louis.

The presidents of the roads leading east from St. Louis met at Cleveland Nov. 9, and after considering an exhibit of the business by all the roads, agreed upon the following rates St. Louis to New York: by the Vandalia, $23.50; Bee Line, $22.50; Wabash, $21.50; Ohio & Mississippi, $20.50. This is an increase of fifty cents by all lines, but does not change existing differentials. Before the rate cutting of a month ago the rate by the Vandalia was $23.50 and by the Bee Line was $22, so that the contest, which was virtually between these two lines, has resulted in the reduction of the differential from $1.50 to $1; and this is done by raising the lower instead of reducing the higher rate. Exhibits of business are to be made everythree months to the presidents, when a new adjustment of rates will be made if found necessary.

Emigrant Rates.

The low rates of fare for emigrants from New York westward continue in effect. The sharp contention between the Delaware, Lackawanna & Western and the New York, Ontario & Western, on one side, with the other lines, has led to the offering by the latter of large commissions to boarding-house keepers, street runners and others. The fare to Chicago is nominally $5. Out of this the stronger lines are said to be paying $1.50 and $2 commission, with correspondingly high commissions on tickets to points beyond Chicago. The volume of emigrant traffic is at present, however, small. It is said that about all of the California business from Castle Garden goes by steamer to New Orleans.

West-bound Rates.

On Monday of this week the New York Central announced a reduction of all rail rates from New York to Chicago to a basis of 50 cents first-class, being one-third less than the tariff which has been in force for a long time. The reason for this action is stated by the officers of that road to be the secret cutting by their competitors. All the old devices for evading tariffs, such as under billing, payment of cartage charges, employment of shippers' clerks by the railroad companies at a salary or on commission, etc., are alleged to have been practiced, and it seems certain that they have been quite common. The officers of the Central will not accuse any road by name, but the so-called weaker lines seem to be the ones meant. The New York newspapers have been filled with somewhat vague allegations that the Pennsylvania has been cutting these rates for some time past, but no evidence is adduced to this effect, and these views seem to originate in Wall street. In an interview with a New York Central officer he is quoted as saying: "We are satisfied that the tariff has not been maintained by more than one of our competitors."

An interview with President Roberts, of the Pennsylvania, published in Philadelphia Tuesday, is to the effect that he was greatly surprised by the action of the New York Cen-

tral. In answer to the question if west-bound rates had been maintained, he said:

"Very well, I believe. We have heard no complaints, and we would have heard some had there been any serious demoralization. The Pennsylvania has maintained rates strictly. There has been no shrinkage in the volume of traffic and I am entirely unable to account for the reduction. Our policy simply is to meet secret rates with public ones. That is, if we hear of a competitor making a rate secretly that is below the published tariff, the Pennsylvania Railroad will make the same rate openly."

It will be remembered that the present east-bound rates on grain (20 cents) and some other commodities are maintained at a low figure by the persistency of the Pennsylvania, in spite of a volume of traffic which is reported as large.

The other lines at once issued west-bound tariffs to correspond with the New York Central, those which are allowed a differential of five cents announcing rates on a basis of 45 cents to Chicago.

Western Freight Rates.

The Chicago & Northwestern has given the ten days' notice required by the rules of the Western Freight Association of a reduction in the rates on live stock and packing house products from Omaha to Chicago. The minimum rate named in the notice is 5 cents per 100 pounds, but it appears from the statement of Northwestern officers that this is merely a starting-point for a proposition to agree upon a uniform rate for all the lines. The cause of this radical notice from the Northwestern is the cutting done by other roads from 20 cents to 12 on provisions, etc.—this cutting having in turn been occasioned by contracts entered into by the Chicago & Alton by which that road takes shipments of this kind from Kansas City at very low rates until Jan. 1.

East-bound Shipments.

The shipments of east-bound freight from Chicago by all the lines for the week ending Saturday, Nov. 10, amounted to 50,851 tons, against 54,924 tons during the preceding week, a decrease of 4,073 tons, and against 38,961 tons during the corresponding week of 1887, an increase of 11,890 tons. The proportions carried by each line were as follows:

	W'k to Nov. 3.		W'k to Nov. 10.	
	Tons.	P. c.	Tons.	P. c.
Wabash	3,752	6.8	4,233	8.2
Michigan Central	6,880	12.5	5,394	10.5
Lake Shore & Mich. So.	7,964	14.5	6,357	12.5
Pittsburgh, Ft. W. & Chicago	7,521	13.7	5,944	11.6
Chicago, St. L. & Pittsburgh	8,941	16.3	7,566	14.8
Baltimore & Ohio	1,728	3.1	1,649	3.1
Chicago & Grand Trunk	7,911	14.4	8,737	17.1
N. Y., Chicago & St. Louis	4,696	8.6	4,891	9.5
Chicago & Atlantic	5,531	10.1	6,085	12.7
Total	54,924	100.0	50,856	100.0

Of the above shipments 2,608 tons were flour, 22,454 tons grain, 3,310 tons cured meats, 1,692 tons lard, 6,925 tons dressed meats, 656 tons butter, 1,431 tons hides, 469 tons wool, and 2,677 tons lumber.

The three Vanderbilt lines carried 32.5 per cent. of all the shipments, and the two Pennsylvania lines 26.4 per cent.

Coal.

The coal and coke tonnage of the Pennsylvania originating on lines east of Pittsburgh and Erie for the week ending Nov. 3, and the year to that date, was as follows:

	Coal.	Coke.	Total.
Total for week ending Nov. 3	226,505	93,456	319,961
Total for year 1888 to date	9,772,975	3,363,340	13,136,315
Total for year 1887 to date	8,623,662	3,042,176	11,665,838

The anthracite coal tonnage of the Belvidere division of the United Railroads of New Jersey division for the same periods was as follows:

	1888.	1887.	Inc.
Total for week	35,137	19,977	15,159
Total for year	1,401,528	1,318,492	83,035

The coal tonnage for the week ending Nov. 10 is reported as follows, in tons:

	1888.	1887.	Increase.	P. c.
Anthracite	776,107	731,829	44,278	6.1
Bituminous	359,468	332,858	26,610	11.4

CENTRAL OF GEORGIA.

The statement of the Central of Georgia for September and three months of the fiscal year is as follows:

	1887-8.	1886-7.	Inc. or Dec.	
September:				
Earnings	$646,361	$784,702	D.	$138,340
Expenses	387,892	437,143	D.	49,250
Net	$258,469	$347,559	D.	$99,090
July 1 to Sept. 30:				
Earnings	$1,674,147	$1,671,370	I.	$2,776
Expenses	1,084,271	1,120,418	D.	36,147
Net	$589,876	$550,952	I.	$38,923
Income	4,512	21,582	D.	17,069
Total net	$594,388	$572,534	I.	$21,854

MANHATTAN ELEVATED.

The report for the year to Sept. 30 shows:

	1888.	1887.	1886.
Gross income	$8,673,871	$8,102,662	$7,426,216
Op. expen. and taxes	5,201,050	4,970,449	3,960,191
Net	$3,472,821	$3,132,212	$3,466,024
All charges	1,554,080	1,554,080	1,806,393
Balance	$1,918,741	$1,578,132	$1,569,631
Dividends, 5 p. c.	1,300,000	1,560,000	1,560,000
Surplus	$618,741	$18,132	$99,631
Earned on stock	7.38 p. c	6.07 p. c.	6.3 p. c.
Passengers carried	171,529,789	158,963,232	
Payments for property damages	$513,770		

BALTIMORE & OHIO.

The following shows the company's earnings and expenses for October, 1888, approximated, as compared with October, 1887: Earnings, 1887, $1,948,287; 1888, $1,887,946: decrease, $80,341. Expenses, 1887, $1,204,992; 1888, $1,178,440: decrease, $26,552. Net, 1887, $743,295; 1888, $689,506; decrease, $53,789.

STATEN ISLAND RAPID TRANSIT.

The statement for the quarter ending Sept. 30 shows:

	1888.	1887.	Increase.
Gross earnings	$374,199	$337,156	$37,043
Oper. expenses	197,574	182,634	14,940
Net earnings	$176,625	$154,522	$22,103
Fixed charges	70,244	63,139	7,105
Surplus	$106,381	$91,383	$14,998
Cash on hand	32,923		
Profit and loss def.	119,144		

BOSTON & ALBANY.

The statement for the quarter ending Sept. 30 shows:

	1888.	1887.	Inc. or Dec.	
Gross earnings	$2,466,750	$2,545,125	D.	$78,375
Oper. expenses	1,287,538	1,363,166	D.	75,628
Net earnings	$1,179,212	$1,181,959	D.	$2,747
Other income	16,591	8,658	I.	7,933
Total	$1,195,803	$1,190,617	I.	$5,186
Fixed charges	215,405	221,267	D.	5,862
Surplus	$980,397	$969,349	I.	$11,048
Cash on hand	732,280	752,086	D.	19,806
Profit and loss sur.	497,022	427,214	I.	69,808

HARTFORD & CONNECTICUT WESTERN.

The statement for the quarter ending Sept. 30 shows:

	1888.	1887.	Inc. or Dec.	
Gross earnings	$111,869	$102,187	I.	$9,582
Oper. expenses	45,320	55,559	D.	10,239
Other income	$2,445	$623	I.	$1,822
Fixed charges	14,015	12,720	I.	1,295
Net income	54,943	$34,631	I.	$20,312
Cash on hand	63,558	31,379	I.	32,179
Surplus	103,267	43,891	I.	59,276

DELAWARE & HUDSON CANAL CO.'S LEASED LINES.

The following shows the returns for the quarter ending Sept. 30:

	1888.	1887.	Inc. or Dec.	
Rensselaer & Saratoga:				
Gross earnings	$803,656	$810,362	D.	$6,706
Oper. expenses	443,387	449,486	D.	6,099
Net earnings	$360,269	$360,876	D.	$607
Fixed charges	254,583	255,864	D.	1,281
Surplus	$95,686	$95,012	I.	$674
Albany & Susquehanna:				
Gross earnings	$975,816	$844,017	I.	$131,799
Oper. expenses	476,699	513,272	D.	36,573
Net earnings	$499,117	$330,745	I.	168,372
Fixed charges	249,752	258,516	D.	8,764
Surplus	$249,365	$72,229	I.	$177,136
New York & Canada:				
Gross earnings	$283,404	$255,951	I.	$37,453
Oper. expenses	144,698	147,814	D.	3,116
Net earnings	$138,706	$108,137	I.	$30,569
Fixed charges	65,328	66,210	D.	882
Surplus	$73,377	$41,926	I.	$31,451

PRESCOTT & ARIZONA CENTRAL.

The statement for October and for the ten months shows:

	1888.	1887.	Increase.
Month of October:			
Gross earnings	$10,944	$7,175	$3,768
Oper. expenses	3,611	2,952	659
Net earnings	$7,233	$4,223	$3,109
Ten months—Jan. 1 to Oct. 30:			
Gross earnings	$101,880	$74,111	$27,768
Oper. expenses	32,869	30,397	2,471
Net earnings	$69,011	$43,713	$25,297

CLEVELAND, COLUMBUS, CINCINNATI & INDIANAPOLIS.

The earnings for September and the nine months to Sept. 30 are:

	1888.	1887.	Inc. or Dec.	
Month of September:				
Earnings	$783,563	$809,822	D.	$26,259
Expenses	453,273	462,814	D.	19,541
Net	$330,290	$347,008	D.	$16,718
Charges and imp'ments.	182,856	174,454	I.	8,602
Surplus	$147,434	$172,754	D.	$25,320
Nine Months—Jan. 1 to Sept. 30:				
Earnings	$5,582,204	$5,766,272	D.	$184,068
Expenses	4,003,697	3,866,046	I.	137,651
Net	$1,578,507	$1,930,226	I.	$351,719
Charges and imp'ments.	1,619,149	1,974,476	D.	355,327
Deficit	$40,642	$44,250	D.	$3,608

Railroad Earnings.

Earnings of railroad lines for various periods are reported as follows:

	1888.	1887.	Inc. or Dec.		P.c.
Month of September:					
Bur., Ced. Rap. & No	$280,433	$269,062	I.	$11,371	4.2
Net	84,919	74,656	I.	10,263	13.7
Carolina Central	41,112	54,483	D.	13,371	24.5
Net	12,983	20,510	D.	7,527	36.7
Central Iowa	126,681	121,370	I.	5,311	4.4
Net	13,238	28,487	D.	15,249	5.3
Ches., Ohio & S. W.	170,382	187,046	D.	16,664	8.9
Net	66,643	90,151	D.	23,508	26.1
Chi., Bur. & North.	195,792	173,062	I.	22,730	13.1
Net	58,278	36,348	I.	21,930	60.4
Chic., Bur. & Quincy	2,475,144	2,464,924	I.	10,220	.4
Net	988,448	1,333,317	D.	144,869	12.7
Flint. & Pere Marq.	182,472	223,833	D.	41,361	18.4
Net	63,192	70,724	D.	7,532	10.6
Kentucky Central	101,342	107,318	D.	5,976	5.6
Net	39,955	56,759	I.	3,196	5.6
Louis., N. O. & Tex.	149,942	181,534	D.	31,592	17.4
Net	20,056	58,682	D.	38,626	65.8
Ohio River	47,520	43,538	I.	3,982	9.1
Net	24,746	24,107	I.	639	2.6
Ore. Improve. Co.	405,196	362,443	I.	42,753	11.8
Net	127,356	110,196	I.	17,160	15.5
Ore. Ry. & Nav. Co.	623,089	487,246	I.	135,843	28.1
Net	254,271	227,959	I.	26,312	11.5
Seaboard & Roanoke	57,957	65,638	D.	7,681	11.7
Net	25,906	28,265	D.	2,359	8.3
Tol. & Ohio Central.	111,283	107,419	I.	3,864	3.6
Net	35,596	42,990	D.	7,394	17.2
Nine Months ending Sept. 30:					
Bur., Ced. Rap. & N.	1,943,169	2,081,330	D.	138,161	6.6
Net	392,689	453,931	D.	61,242	13.5
Carolina Central	362,248	351,114	I.	11,134	3.2
Net	107,526	96,665	I.	10,861	11.2
Central of Georgia	4,895,082	4,381,961	I.	513,121	11.7
Net	1,521,213	1,280,403	I.	240,810	18.8
Central Iowa	989,833	950,749	I.	39,084	4.1
Net	51,012	57,401	D.	6,389	11.1
Ches., Ohio & S. W.	1,531,676	1,366,679	I.	64,997	4.7
Net	501,419	544,703	D.	43,284	7.9
Chi., Bur. & No.	1,355,938	1,786,409	D.	430,471	24.1
Net	177,401	426,212	D.	248,811	58.4
Chi., Bur. & Quincy.	16,588,313	20,290,934	D.	370,262	18.2
Net	3,317,075	9,056,175	D.	5,739,100	63.3
Flint & Pere Marq.	1,800,749	1,928,188	D.	127,439	6.6
Net	554,061	619,996	D.	65,935	10.6
Kentucky Central	750,495	779,695	D.	29,200	3.7
Net	326,317	329,629	D.	3,312	1.0
Louis., N. O. & Tex.	1,581,991	1,351,787	I.	230,204	1.7
Net	339,173	334,901	I.	4,272	1.3
Ohio River	335,612	255,045	I.	80,567	31.6
Net	145,421	116,674	I.	28,747	24.6
Ore. Imp. Co.	3,724,097	2,971,431	I.	752,666	25.3
Net	831,667	814,960	I.	16,707	2.0
Ore. Ry. & Nav. Co.	4,507,272	3,605,306	I.	901,966	25.0
Net	1,555,092	1,451,170	I.	103,922	7.2
Seaboard & Roanoke	462,075	423,131	I.	38,994	9.2
Net	148,227	140,160	I.	8,067	5.6
Tol. & Ohio Central.	857,511	753,649	I.	103,862	13.7
Net	242,941	237,257	I.	5,684	2.4
Month of October:					
Mar., Col. & No.	7,837	6,830	I.	1,007	14.8
Net	3,715	3,618	I.	97	2.7
Prest. & Ariz. Cen.	10,944	7,176	I.	3,768	52.3
Net	7,333	4,233	I.	3,100	73.8
Ten months ending Oct. 31:					
Mar., Col. & North.	71,532	55,842	I.	15,690	28.1
Net	30,926	25,444	I.	5,482	21.5
Pres. & Ariz. Cen.	101,880	74,112	I.	27,768	37.5
Net	69,011	43,724	I.	25,287	57.8
Month of October:					
Atlantic & Pacific	$287,948	$228,734	I.	$59,214	21.5
Bur., Ced. Rap. & N.	330,856	319,668	I.	11,188	3.5
*California Southern	58,777	79,334	D.	20,557	25.9
Canadian Pacific	1,305,000	1,263,966	I.	41,034	32.5
Cape F. & Yad. Val.	35,680	29,128	I.	6,552	22.5
Central of Iowa	142,798	128,673	I.	14,125	1.2
*Central Vermont	185,829	190,955	D.	5,126	2.7
Chesapeake & Ohio.	396,528	412,349	D.	15,821	3.8
*Ches., Ohio & So. W.	137,411	148,484	D.	11,073	7.5
Chicago & Atlantic.	193,498	214,645	D.	21,147	9.8
Chi. & East. Ill.	222,919	203,971	I.	18,948	9.3
Chi. & Ind. Coal	52,554	48,440	I.	4,114	8.5
Chi., Mil. & St. Paul	2,942,500	2,800,689	I.	141,811	5.1
Chicago & Ohio R.	6,635	5,202	I.	1,433	27.5
Chi., St. P. & K. C.	270,571	227,120	I.	43,451	19.1
Chi. & W. Mich.	128,463	128,625	D.	162	.1
Cin., Jack. & Mack.	53,782	53,669	I.	113	.2
Cin., N. O. & Tex. P.	329,780	328,543	I.	1,237	.4
Ala. Gt. South	139,207	153,792	D.	14,585	9.4
N. O. & Northeast.	88,145	84,046	I.	4,099	4.9
Vick. & Mer.	51,220	66,390	D.	15,170	23.0
Vick., Sh. & Pac.	68,889	77,578	D.	8,689	11.2
Cin., Rich. & Ft. W.	37,216	40,114	D.	2,898	7.2
Cin., Wash. & Balt.	193,837	214,636	D.	20,799	9.6
*Cleve., Akron & Col.	52,021	35,975	I.	16,046	44.5
Cleve. & Marietta	27,189	31,176	D.	3,987	12.7
Col. & Cin. Midland.	33,034	30,410	I.	2,624	8.6
Col., Hock. V. & Tol.	308,278	283,570	I.	24,708	8.7
Den. & Rio Grande.	729,200	797,565	D.	68,365	8.5
*Denv. & Rio Gr. W.	86,300	82,475	I.	3,825	4.6
Det., Lansing & No.	106,088	99,449	I.	6,639	6.7
*East Tenn., Va. & G.	323,824	389,147	D.	15,323	3.9
Evansville & Ind.	24,513	20,242	I.	4,271	21.2
Evans. & T. Haute.	77,037	78,303	D.	1,266	1.6
Flint. & Pere. Mar.	203,412	219,098	D.	15,686	7.1
*Ft. Worth & Den. C.	78,931	55,989	I.	22,942	4.0
Gr. Rapids & Ind.	204,042	221,205	D.	17,163	7.8
Other lines	19,038	16,762	I.	2,276	13.5
†Grand Trunk of Can.	1,683,424	1,703,101	D.	19,677	10.2
*Houston & Tex. Cen	309,592	298,834	I.	10,758	3.6
Kanawha & Ohio.	23,705	23,853	D.	148	.6
*Kan. C., Ft. S. & M.	250,341	273,694	D.	23,353	8.5
*Kan. C., Clin. & Sp.	15,959	14,453	I.	1,506	10.4
Kentucky Central	104,839	104,797	I.	42	...
*Keokuk & Western.	21,964	23,701	D.	1,737	7.3
Kingst. & Pembroke.	21,198	20,079	I.	1,119	5.5
Lehigh & Hudson.	22,357	17,936	I.	4,421	24.7
*Little Rock & Mem.	43,451	74,343	D.	30,892	41.5
Long Island	287,006	265,966	I.	21,040	7.9
Louis., Evan. & St. L.	89,637	96,814	D.	7,177	7.3
Louis. & Nashville	1,433,525	1,538,706	D.	105,181	6.8
Louis., N. Alb. & Chi.	216,068	208,269	I.	7,799	3.7
Louis., N. O. & Tex.	237,144	255,127	D.	17,983	7.1
Mar., Col. & Northern	7,837	6,830	I.	1,007	14.8
*Memphis & Charles.	94,460	133,319	D.	38,859	29.1
‡Mexican Central	445,914	444,216	I.	1,698	3.8
*‡Mexican Railway	197,324	207,103	D.	9,779	4.7
Mil., L. Sh. & West.	305,663	293,310	I.	12,353	4.2
Mo., Kansas & Tex.	632,752	690,241	D.	57,489	8.3
Mobile & Ohio.	254,170	262,480	D.	9,310	3.6
*Natch. Jack. & Col.	10,242	13,721	D.	3,479	25.4
N. Y. C. & H. R.	3,175,796	3,534,900	D.	359,104	10.2
N. Y. & Northern.	49,500	49,321	I.	179	.4
N. Y., Ont. & West.	144,174	145,356	D.	1,182	.8
Norfolk & Western.	445,623	397,752	I.	47,871	12.0
Northern Pacific.	2,218,894	1,674,881	I.	544,013	32.5
Ohio & Mississippi.	382,418	413,137	D.	30,719	7.4
Ohio River.	52,922	46,024	I.	6,898	15.0
Ohio Southern.	55,999	61,129	D.	5,130	8.4
Ohio Valley of Ky.	11,917	9,138	I.	2,779	30.5
Pittsburgh & West.	194,172	207,218	D.	13,046	6.3
Prescott & Ariz. Cen.	10,944	7,176	I.	3,768	52.3
Rich. & Danville.	563,300	527,800	I.	35,500	6.7
Va. Midland Div.	166,000	154,000	I.	12,000	7.8
Charl., C. & A. Div.	115,750	109,228	I.	6,522	5.9
Col. & Greenv. Div.	69,800	65,801	I.	3,999	6.1
Western N. C. Div.	62,350	62,304	I.	46	....
W., O. & W. Div.	12,200	11,800	I.	400	3.4
Ashev. & Spar. Div.	10,900	10,158	I.	742	7.3
St. L., A. & T. H. brs	95,888	106,136	D.	10,248	9.6
St. L., Ark. & Tex.	374,223	347,458	I.	26,765	7.7
St. L. & San Fran.	639,687	619,181	I.	20,506	3.3
St. Paul & Duluth.	169,962	206,484	D.	43,522	21.1
St. Paul, Minn. & M.	972,600	1,061,800	D.	89,200	8.3
San A. & Aran. Pass.	100,144	68,475	I.	31,669	4.6
Shenango Valley.	75,000	96,043	D.	21,043	21.9
Staten Island Rap. T.	60,505	62,307	D.	1,802	2.8
Texas & Pacific.	675,705	728,362	D.	52,657	7.2
Tol. & Ohio Central.	134,676	110,071	I.	24,605	22.3
Tol., Peoria & West.	94,632	104,079	D.	9,447	9.1
Valley of Ohio.	62,959	55,308	I.	7,651	13.8
Wabash Western.	563,678	628,390	D.	64,712	10.3
West N. Y. & Penn.	306,100	260,053	I.	46,047	17.7
Wheeling & Lake E.	82,821	65,709	I.	17,112	26.0
Wisconsin Central.	414,663	385,784	I.	28,879	7.5
Total	$29,156,446	$29,071,264	I.	$85,038	.3

* Includes three weeks only of October in each year.
† For four weeks ended Oct. 27.
‡ Mexican currency.

Early reports of monthly earnings are usually estimated in part, and are subject to correction by later statements.

Cotton.

The cotton movement for the week ending Nov. 9 is reported as follows, in bales:

	1888.	1887.	Decrease.	P. c.
Interior markets:				
Receipts	169,080	212,271	42,591	20.1
Shipments	148,443	167,210	18,767	11.2
Stock	243,139	347,022	103,883	29.9
Seaports:				
Receipts	272,091	301,600	29,509	9.8
Exports	171,275	192,666	21,391	11.1
Stock	669,807	747,820	78,013	10.4

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